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A Journal of Strategic Airpower & Spacepower

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ÆTHER

A Journal of Strategic Airpower & Spacepower

Spring 2022

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INTRODUCTION

- 3 **James B. Hecker, Commander, President, Air University**
- 5 **From the Editor**

LEADING VOICES

- 8 **Ready to Meet the Moment**
CQ Brown Jr.
- 13 **A New Kind of War**
JoAnne S. Bass
- 17 **75 Years of Mobility Operations**
Evolving for the Next 75
Jacqueline Van Ovost
- 22 **After Defeat**
A Time to Rebuild
S. Clinton Hinote
- 35 **Sailing the New Wine-Dark Sea**
Space as a Military Area of Responsibility
John E. Shaw
Jean Purgason
Amy Soileau
- 45 **Joint Task Force Quartz**
Through an Airpower Lens
Dagvin R. M. Anderson
Jason T. Hinds
- 51 **A New Battle Command Architecture For**
Joint All-Domain Operations
David A. Deptula

CHANGE: THE FINE PRINT

- 57 **Accelerate Change and Still Lose?
Limits of Adaptation and Innovation**
Heather P. Venable
- 71 **The USAF at 75
Renewing Our Democratic Ethos**
Marybeth P. Ulrich
- 82 **Space Is a Warfighting Domain**
Everett C. Dolman
- 91 **Accelerate Change
Or Lose the Information War**
Karen Guttieri

THE TEST OF TIME

- 106 **Hammer and Anvil
Coercing Rival States, Defeating Terrorist Groups,
and Bombing to Win**
Robert A. Pape
- 118 **Winning a Peer War**
John A. Warden III
- 129 **Rethinking “Airpower Versus Asymmetric Enemies”**
Mark Clodfelter

FROM OUR FRIENDS

- 138 **Air Power 2010–2020
From Helmand to Hypersonics**
Johnny Stringer

INTRODUCTION

JAMES B. HECKER

Like the Air Force, the Air Force flagship professional journal turns 75 this year. Founded in 1947 by the first Air University Commander Major General Muir S. Fairchild, *Air University Quarterly Review* stands as one of the original components of Air University, just one year younger than institution and its founding professional military education colleges, Air War College and Air Command and Staff School (renamed Air Command and Staff College in 1954).

In the subsequent decades, the journal, funded directly by the Chief of Staff of the Air Force, underwent several name changes and oversight organizations at Air University. The journal also developed versions in multiple foreign languages, the longest lasting being the *Journal of the Americas*, the premier trilingual air and spacepower publication in Spanish, Portuguese, and English, started in 1949. Today, Air University Press also includes in its family of scholarly, peer-reviewed journal publications the *Journal of Indo-Pacific Affairs*, a leading forum for international dialogue pertaining to the Indo-Pacific region.

In 2006, one of my predecessors, then-Lieutenant General Stephen Lorenz, took the step of establishing *Strategic Studies Quarterly*, as the content of the flagship publication—*Air & Space Power Journal*—had developed a predominant focus on operations and had moved away from articles strategic in nature. Fifteen years later, in the face of social media and expanded general interest in global affairs by readers regardless of rank, a true flagship Air Force journal effort of the twenty-first century must encompass the overlapping, interdependent realms of operations, national security strategy, and international security.

Consequently, on the occasion of the diamond anniversary, *Strategic Studies Quarterly* and *Air & Space Power Journal* are being rebranded as two parts of one unified Department of the Air Force flagship journal effort. *Æther: A Journal of Strategic Airpower & Spacepower* has replaced *Strategic Studies Quarterly* in name but continues the principled focus on airpower and spacepower issues that drive thought and discourse on key national and international security concerns. *Air & Space Operations Review*, which has replaced *Air & Space Power Journal*, will likewise sustain an emphasis on relevant airpower and spacepower operational innovation, adaptation, and criticism. Both journals will continue to meet and exceed the expectations of readers

Introduction

worldwide, from Airman and Guardian operators to leading national and international security thinkers on airpower and spacepower.

Throughout its history and regardless of title, the flagship professional journal has never failed to stay true to its founding ethos, that is, engaging sensitive, timely topics with scholarly rigor and refreshing candor—and critique, when warranted. The first editor and editorial board of *Air University Quarterly Review* noted in the inaugural issue in the spring of 1947 that “if the appearance here of articles which may not agree with accepted policy, or even with majority opinion, will stimulate discussion and provoke controversy, an important part of this journal’s mission will have been accomplished: to induce airmen to have original thought on these matters and to give these thoughts expression.”¹

The Chief of Staff of the Air Force General CQ Brown Jr. has called on Air University to be the leader in innovative thought and theory for the Department. As a partner with and component of Air University and Air University Press, the professional journals of the Department of the Air Force will continue the revered reputation of the journals heretofore, seeking rigorous, scholarly, and intellectually creative content.

This inaugural issue of *Æther: A Journal of Strategic Airpower & Spacepower* appropriately launches the flagship journal effort into its next 75 years.

Thank you for your continued support and interest in the Air Force family of professional journals. We look forward to your feedback and continued improvement.

Lt Gen James B. Hecker, USAF



Commander, President, Air University

1. Editor and Editorial Board, “Editorial,” *Air University Quarterly Review* 1, no.1 (Spring 1947): 94.

FROM THE EDITOR

As a reader of the journal, you are an active participant in the ongoing development of the ideas that fill these pages. The articles herein contain propositions that demand engagement, both as a supporter and as a critic. The 15 articles in our inaugural issue cover a broad range of strategic topics of concern to Airmen, Guardians, and others invested in national and international security as they relate to airpower and spacepower. We hope you find much with which to grapple. This issue begins with leading voices from the US Air Force and US Space Force, commentaries and perspectives intended to ground the journal in its airpower and spacepower foundations. In future issues, scholarly contributions will engage national and international security challenges and will explicitly highlight their relevance to airpower and spacepower.

The inaugural issue of *Æther: A Journal of Strategic Airpower & Spacepower* has been in development for over six months. The journal team, from editors to typesetters to illustrators, has worked tirelessly to produce this volume, and I am exceedingly grateful for the many hours of hard work involved. Similarly, I want to thank the authors, without whom we would have no journal. Their support and professionalism are unequalled, and we appreciate the many hours of drafting and revising they spent on their contributions to this issue.

Chief of Staff of the Air Force General CQ Brown Jr., headlines the journal with a call to the Air Force to meet the challenges of the next few decades in the accelerated manner in which it has for the duration of its existence to date—from propellers to jet-powered aircraft in the proverbial blink of an eye. Chief Master Sergeant of the Air Force JoAnne Bass, mindful of the criticality of our force and their families, advises our Airmen to be vigilant against influence operations waged by adversaries, recognizing information warfare for what it is and actively combatting it.

The forum then shifts to the critical concern of logistics, the importance of which has made a resurgence across the nation as a whole due to recent months and years of a global pandemic and compromised supply chains. Commander of US Transportation Command General Jacqueline Van Ovost pledges that to meet the complex and dynamic nature of future challenges to national security, US Transportation Command will reemphasize maneuver and evolve how that concept is applied across domains. In a thought experiment, the Air Force Deputy Chief of Staff for Strategy,

Integration, and Requirements Lieutenant General S. Clinton Hinote looks to a fictitious but possible future scenario of defeat, calling on the Air Force to implement necessary changes to avoid this outcome. Specifically, he emphasizes space and air defense by deterrence, rebuilding key alliances, and rebuilding our aerospace nation and that of our Allies and partners.

Turning to spacepower, Deputy Commander of US Space Command Lieutenant General John Shaw, Major Jean Purgason, and Captain Amy Soileau delve into the significance of the designation of space as a military area of responsibility. They highlight four propositions and propose new terminology that will help guide the development of the military stewardship of this domain, ensuring its relevance to everyone. The Joint Staff J3 Vice Director of Operations Major General Dagvin R. M. Anderson and US Air Forces Europe/US Air Forces Africa Director of Plans, Programming, and Analysis Brigadier General Jason Hinds take us through an analysis of the lessons learned from Joint Task Force Quartz. They find that as the Air Force develops new operational concepts, command relationships must be built upon centralized command, distributed control, and decentralized execution: in short, mission command.

Retired Lieutenant General David Deptula, director of the Billy Mitchell Institute at the US Air Force Academy, closes the “Leading Voices” forum, arguing that as the service embarks on its massive evolution from a combined air and space operations center-focused structure to more agile and disbursable command and control structures, it must immediately implement the architecture for the command and control this new system will require.

In the first article in the second forum, “The Fine Print,” Heather Venable pulls on threads introduced by General Brown, Lieutenant General Hinote, and Lieutenant General Deptula, observing that calls to accelerate change or lose provide brief nods to concepts and ideas but inherently privilege more technological solutions. She asks, even if we can innovate or adapt, does that mean we should? The absence of a sound strategy makes innovation or adaptation a questionable proposition at best. Marybeth Ulrich alerts readers to a general decline in civics knowledge in recent decades across US society and its correlative effect on Airmen and Guardians in the service today. She observes that the 75th anniversary of the Department is the critical time to recommit to a democratic ethos preferencing service members’ obligations to the oath of office above personal interests and shares an innovative program at the US Air Force Academy designed to address this.

The forum continues with a contribution by Everett Dolman that discusses the notion of space as a warfighting domain. He heralds the long-overdue declaration of the military domain, noting the implications for force structure, budget decisions, and public and international perceptions, and what this means for the culture of the nation’s newest military service. Principally, he explores the role military spacepower plays in the larger context of civil and commercial spacepower. Karen Guttieri concludes the forum, bringing it back full circle to notions raised by General Brown and CMSAF Bass. To win against our near-peer adversaries, the Department, through a fully developed interdisciplinary professional military education curriculum, must develop and

promote strategists, growing an officer corps that can overcome vulnerabilities and seize opportunities—execute a new way of war—in the cyberspace domain and information environment.

The third forum, “The Test of Time,” invites back to the journal pages leading elder statesmen of airpower. Robert Pape updates his key airpower theory promulgated in *Bombing to Win*, contending that effective airpower lies not so much in technology, balance of forces, civ-mil relations, or command and control over forces but instead turns fundamentally on understanding the enemy. John Warden posits that as the United States prepares for war with a near-peer competitor, the best course toward victory involves an accepted and practiced methodology for developing a high-resolution, unequivocal strategy inculcated by the principles of parallel war and strategic paralysis.

The forum closes with Mark Clodfelter who discusses his 2006 framework as a method of analysis for the different applications of airpower. He identifies five key variables that affect the ability of a distinct application of airpower to achieve political success, namely, the nature of the enemy, the enemy’s way of war, the combat environment, the magnitude of military controls, and political objectives.

Our issue concludes with a new permanent forum that aims to reengage our Allies and partners, critical to our national security and the promotion and perpetuation of democratic institutions and global stability. “From Our Friends” features a reprint of a recently published chapter penned by Royal Air Force Air Vice-Marshal Johnny Stringer, most recently Director of Strategy for UK Strategic Command. AVM Stringer examines key events in the last decade of airpower employment and finds the West and its allies are at an inflection point in the employment and utility of airpower and spacepower—we can no longer dictate all the terms of the debate.

We are grateful for your continued support of the journal. To the next 75 years!
~The Editor

READY TO MEET THE MOMENT

CQ BROWN JR.

The task of preparing the Air Force to accelerate change is solidly rooted in the service's brief but noteworthy history. The US Air Force went from propellers to jet-powered aircraft in the blink of the eye. In the 1950s, the service rapidly developed intercontinental ballistic missiles, the world's greatest nuclear deterrent. From there, the Air Force mastered stealth and precision weapons. The next few chapters in the Air Force story are likely to be as challenging as anything we've ever done. But change ensures the service remains ready, as always, to meet the moment.

History has long demonstrated that the ability to imagine the future and act on that informed intuition are critical to preparation for war. In the case of World War II, American and Allied planners understood years before conflict erupted that emerging technologies from the development of carrier aviation to strategic bombing, radar, and mechanized infantry would radically change warfare. In Vietnam, many painful epiphanies came both during and after the fighting when the Air Force and Navy suffered unacceptable aircraft losses due to insufficient training and the proliferation of advanced anti-aircraft missiles. Those failures led directly to better weapons and the standing up of superb training programs such as Red Flag, at what is now the Air Force's Warfare Center, and similar innovations at the Navy's Top Gun school. They also spawned research into stealth and precision-guided munitions, signature capabilities of the 1991 Persian Gulf War.

As those who follow national security know, the Air Force's current emphasis on "Accelerate Change or Lose" highlights the urgency required to tackle the complex problem of Chinese and Russian military modernization. If we get this right, the Air Force is poised to set the stage for a future force that will be able to deter or, if necessary, defeat near-peer adversaries. We know from more than a decade's worth of war gaming that maintaining the status quo is a recipe for failure. China, in particular, has assembled a formidable set of anti-access technologies that have forced all US military branches and our Allies and partners to radically rethink what success requires.

As we approach the seventy-fifth anniversary of the US Air Force, it is a good time to ask what the future look might like and to outline how we get there. What are the modern analogues to the development during the interwar years of carrier aviation and strategic bombing? What type of Airmen do we need to deter skilled and deter-

mined adversaries? How do we develop and prepare our Airmen for a much different future?

A series of action orders I issued to set the stage focuses on four areas: Airmen, Bureaucracy, Competition, and Design Implementation. Airmen need to lead the change we seek, just as they have always done when it comes to developing innovative ideas and capabilities. To accelerate the required institutional shift, we must remove bureaucratic hurdles to a much greater extent than we have before. Decisions on even routine matters frequently take too long and require too many layers of approval. At the same time, we must reintroduce a fierce competitive mindset akin to what existed during the height of the Cold War. Over the past three decades, we have successfully fought regional wars and counterinsurgencies. It is now time to turn our full attention to advancing militaries that aim to challenge US and Allied supremacy. And, finally, through design implementation, we need to optimize our force structure and basing concept with the primary goal of deterring or defeating these new existential threats.

The mission of the United States Air Force is to Fly, Fight and Win . . . Anytime, Anywhere. This has perhaps never been more relevant than it is today. We know from rigorously studying the problem, just as Army Air Corps and Navy planners did ahead of World War II, that incremental change will not be good enough. For example, in recent years, the Chinese military has developed a stockpile of long-range, high-speed missiles that threaten many of our Joint Force's long-held notions of how to deploy and operate in the Indo-Pacific region. We now realize we must develop a markedly different approach that, for the Air Force, could mean agile operations from pop-up bases; swarms of autonomous, unmanned weapons; a dispersed and robust command-and-control system; a sensor grid that capitalizes on remarkable advances in technology and miniaturized components; and weapons with longer ranges. In the future, we will almost certainly need to rely on survivable, stand-off munitions—not platforms—to defeat Chinese defenses.

In parallel, we must develop the next-generation platforms, sensors, and ubiquitous networks that can share data across the US military and with Allies and partners, out to the tactical edge. Our sensors will need to operate in all domains and be tied to a persistent command-and-control structure—assisted by artificial intelligence and machine learning—and be able to curate vast amounts of data and make that available to the Joint Force and every US Ally and partner involved in the operation. Imagine the advantage the British gained from their Chain Home early warning radar network during the Battle of Britain, and now think of a modern version operating across vast distances in space and across land, sea, air, and cyberspace.

As it has historically, the Air Force will be called upon to execute a broad and challenging mission. The good news is, the technological challenges do not appear to be too steep for us to refine and enhance our core mission sets—we are the only service that provides the Joint team, Allies, and partners with the assurance of air superiority, the advantage of global strike, and the agility of rapid global mobility. Combined with intelligence, surveillance, and reconnaissance and command and control, we have the ability to sense, make sense, and act.

We must be resilient and have the ability to create near-instantaneous effects for combatant commanders anytime, anywhere. Our unique mission set requires that we also are able to defend the homeland, project airpower, support the Joint Force, and make foundational investments to guarantee success. As with any type of change, this effort to win in the future demands a culture shift within our service, a realization among industry and Congress that the threat requires stronger collaboration from many stakeholders, and an understanding that business as usual is not an option. What will the Air Force look like in 2030 or 2035? The short answer is, much different.

A Future Force For Future Threats

The return to strategic competition with near-peer adversaries able to threaten not only the American homeland but also its ideals and values, coupled with the need to holistically transform our Air Force to compete, deter, and win in a highly contested environment, will require a campaign of operations, activities, and investments—intentionally linked and strategically aligned—rather than sporadic and disconnected events.

Defeating—or, better yet, deterring—China and Russia will lead us down new paths. The concept of “Integrated Deterrence” is one that holds great promise. By improving the way we leverage the capabilities of Allies and partners and building far more robust interoperability, we will strengthen our hand, especially in the Indo-Pacific region.

In a series of recent meetings with my fellow air chiefs around the world, the message came through loud and clear: our partners and Allies crave more cooperation, greater technology and information sharing, and more and better training with the desired end state of stronger partnerships and greater overall levels of deterrence. There are new chapters to be authored here, and I expect the US Air Force will seize this opportunity and help write them.

A long-term campaign of operations, activities, and investments enabling Integrated Deterrence forms a solid foundation. But make no mistake, developing the Air Force necessary to deter or defeat our near-peer adversaries will require a series of trade-offs and a pervasive culture of innovation. Just as the services understood during the run-up to World War II that biplanes and static infantry formations would not survive advancing technology, we know today that some of our current weapons systems and capabilities face a similar fate. The U-2 and the Global Hawk and Reaper remotely piloted aircraft systems (RPAs) need to be replaced by new technology that is persistent, survivable, and connected, creating a new system that enables a resilient sensing grid that can survive the arsenal of long-range anti-aircraft and anti-ship missiles the Chinese and Russians have proliferated.

In that same vein, we now imagine refueling aircraft that can be retooled to provide combat power. That means retiring KC-10s, upgrading KC-135s, and replacing older C-130s with newer C-130Js. It means upgrading workhorse B-52s and unleashing the potential of the B-21. Not every legacy system is obsolete and in need of retirement, but the force we need will look much different both on the tarmac and at bases and in

headquarters in the next decade. Performance, not sentimentality, must guide these critical decisions and choices.

The way of war the Air Force has pioneered since Vietnam, with air operations centers managing regional military operations, will evolve into agile and mobile command-and-control. Air Force doctrine has been modified to emphasize understanding commander's intent throughout the chain of command, which will enable Airmen at the tactical level to operate on mission-type orders. And we have started the work of figuring out how to operate in a highly contested environment with a concept called Agile Combat Employment (ACE). The goal of a current series of exercises in the Pacific, in fact, is to create many small locations from which the Air Force can quickly operate, creating too many targets for prospective enemies to successfully attack. This concept will require both new technology and a culture shift for Airmen long accustomed to large- and static-base operations.

Establishing air superiority in such a continually contested environment demands a parallel effort in new thinking. Right now, we are endeavoring to create a sense of urgency among all Airmen and inculcate a daily focus on innovation and intelligent risk-taking. We may be looking at a future where we take dramatic steps coupling humans with algorithms. It is a near certainty that from this point forward, Airmen will need to be "multi-capable."

We are planting the seeds for this culture shift right now, building upon the groundwork laid by my predecessors in areas such as identifying Airmen with advanced computer coding skills who have helped solve software problems outside of their normal military job duties. We are establishing a bottom-up "ecosystem" for innovation that values and rewards intrepid ideas—a window into the culture we must create for the challenges ahead. For example, we are providing time and resources to allow Airmen to take novel ideas from white board to completion. One Airman, Master Sergeant Powell Crider, has developed a virtual-reality training system for maintainers that has Air Force-wide applications. The future Air Force will be a place where taking such initiative is the rule, not the exception.

In the years ahead, the Air Force will establish new rewards and incentives through informal and formal channels. Revamping performance reports is a critical step. We would do well to follow the advice of the great basketball coach John Wooden, who said, "never mistake activity for achievement." Going forward, our performance reports should not be focused on output—the number of tasks completed—or how much money was saved but should instead be truly focused on outcomes achieved. Personnel evaluations should value boldness and initiative. For leaders, this will mean a shift toward iteration where setbacks are fully expected, incubating a mindset of experimentation and innovative thinking. Turning concepts into reality requires creative individuals and supportive organizations. The world we inhabit will require no less, and we will be asking a lot from America's sons and daughters in the years to come.

As we go about the sober task of preparing the Air Force to accelerate this change, we can draw comfort from our service's brief but noteworthy history. We went from propellers to jet-powered aircraft in the blink of the eye. In the 1950s, we rapidly de-

Ready to Meet the Moment

veloped intercontinental ballistic missiles, the world's greatest nuclear deterrent. From there, we mastered stealth and precision weapons. I know the next few chapters in the Air Force story are likely to be as challenging as anything we have ever done. But I also know we need to change to ensure we are ready to meet the moment, just as we always have. Æ

General CQ Brown Jr., USAF

General Brown is the 22nd chief of staff of the US Air Force.

A NEW KIND OF WAR

JOANNE S. BASS

The more Airmen recognize that influence operations have affected them, the faster we can recover and rebuild our defense against these attacks. Information warfare is not new; what has changed are the tactics our adversaries are using to conduct these operations at scale. We must empower our Airmen to recognize and actively combat this threat.

It was a pretty typical Friday when the story broke that I was going to be the 19th Chief Master Sergeant of the Air Force. As the news hit the streets, I began to hear from people across the globe, including friends, family, and even coworkers I have served with throughout my career. My sister quickly let me know I was now an entry in Wikipedia and even sent me a news article, which is when I made one of the classic internet blunders. I read the comments.

It was quite surprising to me to see and read what total strangers were saying about me and just how quickly the narrative was being hijacked. I had heard terms like “information war” before, but it never resonated just how much this kind of conflict could impact the macro and micro levels of the internet simultaneously. It did not resonate just how easily our adversaries are able to leverage social media, digital media, and the information environment to directly impact the people, readiness, and culture of our Air Force.

If you were to get your hands on a pre-1950 copy of the *KGB Manual of Dezinformatsiya* (disinformation) you would see, on the first page in all capital letters, the proclamation:

IF YOU ARE GOOD AT DISINFORMATION, YOU CAN GET AWAY WITH ANYTHING.¹

The harsh truth is that we have unwittingly been the target of nonkinetic, gray-zone warfare for about a century. Our modern age of disinformation, stretching all the way back to the early 1920s, has evolved into four waves, each roughly a generation apart. Today, we find ourselves in an age of disinformation that has been reborn,

1. Ion Mihai Pacepa and Ronald Rychlak, *Disinformation: Former Spy Chief Reveals Secret Strategies for Undermining Freedom, Attacking Religion, and Promoting Terrorism* (Washington, DC: WND Books, 2013), 157.

reshaped, and refined with new technologies and a culture more and more dependent on the internet.²

This means a generation of America's sons and daughters enter our Air Force after spending a daily average of 58 minutes on Facebook, 53 minutes on Instagram, 50 minutes on Snapchat, and roughly 40 minutes on YouTube.³ Putting that into context, Malcolm Gladwell, in his book *Outliers: The Story of Success*, proposed that if someone spent 10,000 hours in practice or preparation within a given field, they could reach an "expert" level.⁴ Taking into account that most people use multiple platforms, it would take someone about nine years to be a social media master.

Here is the problem: In a world shaped more and more by algorithms and artificial intelligence, are those nine years making us masters of social media, or is social media becoming a master of us? Every time we open Facebook, Instagram, or even Google, we are feeding an algorithm that is designed to learn and predict our patterns. From there, the algorithm delivers custom-tailored information to our timelines that it thinks we want to see. It does not matter what that information is, who authored it, or even if it is factual. All that algorithm is concerned with is delivering content designed to keep us on those platforms longer.

Our adversaries know this. They fundamentally understand the dopamine rush that comes from engagement on social media.⁵ They know social media takes advantage of a desire for validation, and they will intentionally put content on those platforms that causes people to react without thinking. They will look for opportunities to leverage internal conflict within our country for their own gain. China calls this "looting a burning house," and it is one of the 36 stratagems that make up a foundational principle of the "Hundred-Year Marathon."⁶

China is coming for us. Not just militarily, but economically, socially, and yes, even digitally. They are tired of living in what they call a "century of humiliation" and have announced that by 2049 they will take their stand as the world dominant power. This is not an assumption or speculation by the US military. It is a fact.

"In the future, direct confrontation between China and the United States will be unavoidable," said Li Lanqing, former vice premier of the People's Republic of China.⁷ That direct confrontation could come in many forms, especially considering how reliant we have become on the digital environment. If China, Russia, or any of our

2. Thomas Rid, *Active Measures: The Secret History of Disinformation and Political Warfare* (New York: Farrar, Straus and Giroux, 2020), 6.

3. Catherine Hiley, "How Much of Your Time is Screen Time?" USwitch, June 15, 2021, <https://www.uswitch.com/>.

4. Malcolm Gladwell, *Outliers: The Story of Success* (New York: Little, Brown, and Company, 2008), ch. 2.

5. Trevor Haynes, "Dopamine, Smartphones & You: A Battle for Your Time," SITNBoston (blog), May 1, 2018, <https://sitn.hms.harvard.edu/>.

6. Peter Taylor, *The Thirty-Six Stratagems: A Modern Interpretation of a Strategy Classic* (Oxford: Infinite Ideas, 2013), ch. 5.

7. Michael Pillsbury, *The Hundred-Year Marathon: China's Secret Strategy to Replace America as the Global Superpower* (New York: St. Martin's Griffin, 2016), 95.

adversaries hacks one of our satellites, then our way of life—things like putting gas in our cars, accessing our bank accounts, or even calling home—could be disrupted. Combine this kind of attack with a constant flow of influence operations and you have a recipe for destabilization.

That destabilization gets played out at scale and speed across a digital environment where fact loses to fiction on a daily basis. It happens all the time. Social media is designed to hold us in a reactionary state where critical thinking cannot gain a foothold. That is when the trolls come out from under the bridge. Even though adversaries like Russia employ paid internet trolls to sow discord and division, the vast majority of trolling comes from average people giving in to anger online.

“In a report titled ‘Anyone Can Become a Troll,’ a team of researchers found that mounting anger turns users toward trolling behavior,” said Dr. Peter Singer. “And just like conspiracy theories, the more the anger spreads, the more internet users are made susceptible to it.”⁸ The problem with trolling is that it does not always stay online. The outrage born in the digital domain exists in a sea of potential energy that holds our thoughts, ideas, beliefs, knowledge, and emotions. The Chinese call this *shi*, and the Chinese government actively looks for ways to turn that potential energy into kinetic energy for its own strategic advantage.⁹ They are also quite happy to “kill with a borrowed knife,” letting Russia continue their influence operations, which distracts us from the true motives of both countries.¹⁰

Understandably, this paints a pretty bleak picture of the digital domain, which always brings about the argument of whether or not we should continue to engage on social media. Unfortunately, the information environment is a battlespace that can no longer be ignored. The Airmen we are recruiting today will inherit this new kind of war—one that requires them to extend their capabilities across multiple domains. We cannot avoid information warfare, but we can properly educate and train our Airmen on how to fight in it.

“Social media is extraordinarily powerful, but also easily accessible and pliable,” said Singer. “Across it play out battles for not just every issue you care about, but for the future itself.”¹¹ He is right, and he is also right in the fact that we all have a choice in defining the role we play and the influence we have on others within our network. The speed and scale at which information comes at us online is overwhelming and pushes us to abandon critical thinking. We need to teach all Airmen, at all levels, to truly understand this environment and how it impacts them both online and offline.

We need our Airmen to understand that the expectations of their conduct do not end when they go online. Quite the opposite, in fact. As highly contested as the information environment is, we need our Airmen to be true ambassadors of our core values.

8. P. W. Singer and Emerson T. Brooking, *LikeWar: The Weaponization of Social Media* (New York: First Mariner Books, 2018), 165.

9. Pillsbury, *Hundred-Year Marathon*, 238.

10. Taylor, *Thirty-Six Stratagems*, ch. 3.

11. Singer and Brooking, *LikeWar*, 273.

Just as we would not expect an Airman to walk by a problem in the real world, we need them to champion professionalism and critical thinking across the digital domain.

It may seem like a small thing, but by cultivating this positive behavior, we guard ourselves against the influence operations of those who seek to do our nation harm. We also build a culture that embraces the diversity of all Airmen and values the contributions they bring to our Air Force.

The more Airmen recognize that influence operations can, and likely have, affected them, the faster we can recover and rebuild our defense against these attacks. The concept of information warfare is not new, and neither are the core strategies behind it. What is new are the tactics our adversaries are using to conduct these operations at scale. We must empower our Airmen not only to recognize this threat, but also to actively combat it.

This cannot be done in a vacuum.

We need collaborative solutions, developed and implemented at all levels, that truly seek to understand conflict across the gray zone. We need our Airmen to understand what Russia understood in the 1950s when Aleksandr Sakharovsky, former head of the First Chief Directorate of the KGB, said, “World War III was conceived to be a war without weapons—a war the Soviet bloc would win without firing a single bullet. It was a war of ideas.”¹²

I believe in the idea that our Airmen can overcome any obstacle they face. The information environment challenges us, every second of every day. It challenges our people. It impacts our readiness. It erodes our culture. We need to meet this challenge head-on, with multicapable, multidomain Airmen who are ready to take our Air Force into 2030 and beyond. Æ

Chief Master Sergeant of the Air Force JoAnne S. Bass

CMSAF Bass is the 19th Chief Master Sergeant of the US Air Force.

12. Pacea and Rychlak, *Disinformation*, 186.

75 YEARS OF MOBILITY OPERATIONS

EVOLVING FOR THE NEXT 75

JACQUELINE VAN OVOST

Operation Allies Refuge, certain to be studied for generations to come, unmistakably demonstrated the resolve of the logistics enterprise. But we cannot become complacent; the complex and dynamic nature of tomorrow's challenges to US national security require an agile US Transportation Command, flexible, fully integrated, and responsive enough to meet the volume and tempo of warfighters' demands. The command must place renewed emphasis on maneuver and evolve how the concept is applied across domains.

"This evacuation could simply not have been done without the amazing flexibility of U.S. Transportation Command and the airlift provided by the United States Air Force. No other military in the world has anything like it."

General Kenneth F. McKenzie Jr., USMC, Commander,
US Central Command, August 26, 2021



Operation Allies Refuge was a capstone event for the United States Transportation Command (USTRANSCOM). Together with commercial industry and like-minded Allies and partners, USTRANSCOM conducted the largest noncombatant evacuation operation airlift in American history and demonstrated to the world the full range of capabilities of the Joint deployment and distribution enterprise (JDDE).

United States Transportation Command's entire warfighting framework was put to the test, from global posture and mobility capacity to global command and control. This effort demanded the worldwide integration of four department-level agencies (Defense, State, Homeland Security, and Health and Human Services) and four US combatant commands (USTRANSCOM, US Central Command, US European Command, and US Northern Command).

This team employed an extensive global mobility posture encompassing a vast constellation of Allies and partners. Further increasing global capacity, USTRANSCOM utilized commercial industry partners, many of whom volunteered at the first opportunity, and the so-called Total Force (active, guard, and reserve). Underpinning these efforts, a robust command and control network that operated 24/7 provided the decision space for leaders to maneuver force elements in support of the evacuation of over 124,000 personnel to safety.

This monumental effort clearly demonstrated the resolve of the logistics enterprise, and many will study this operation for generations. But while all should celebrate the successes of Operation Allies Refuge, we cannot become complacent, as tomorrow's challenges will present new, complex, and dynamic problems for America's national defense.

In December, our nation commemorated the eightieth anniversary of the attack on Pearl Harbor, which led to the United States entering World War II. Coincidentally, the end of the war just a few years later marked the last time the JDDE faced a traditional contested environment. Since then, US logistics forces have operated largely uncontested, free to maneuver to any point on the globe at a time of our choosing.

Despite the technological advances since World War II, maneuver in a future conflict will likely look more like what bomber crews faced while flying missions over Germany in 1944 than what we have experienced over the last 75 years. Unlike in Operation Allies Refuge, it was not uncommon for aircraft and crews flying missions during World War II to regularly experience threats of direct enemy fire. The operational environment they faced over enemy territory was laden with air defense systems, what we presently call anti-access/area-denial systems.

The Axis powers targeted communications and navigational systems in every theater to deny Allied command and control. The speed at which the enemy advanced, particularly during the first few months in the Pacific Theater, drastically limited access, basing, and overflight. Now with the reemergence of strategic competition, our adversaries will not simply grant advantages we have enjoyed since the end of that war.

In 1947, *Air University Quarterly Review's* first year of publication, Colonel Clifford J. Helfin wrote, "this country should plan and build its Air Force with full knowledge that the methods of waging war are changing at a rate never equaled in history."¹ Today, 75 years later, Helfin's words eloquently define the current strategic climate. At USTRANSCOM, we believe the complexity of future logistic operations will be immense,

1. Clifford J. Helfin, "Mobility in the Next War," *Air University Quarterly Review* 1, no. 2 (Fall 1947): 76, <https://www.airuniversity.af.edu/>.

and the demands will be exponential. Logistics in a contested environment necessitates we return to a doctrinal, World War II-type approach to maneuver.

Furthermore, our success in a contested environment hinges on an agile, adaptable, and resilient workforce, capable of addressing complex challenges. Leaders must create and foster a culture in which the force understands the need to evolve both the concepts and the mindset required to compete, deter, and win.

USTRANSCOM Today

Since its establishment in 1987, USTRANSCOM has existed to project and sustain military power at a time and place of our nation's choosing. USTRANSCOM possesses the unique capability to deploy, sustain, and redeploy forces and equipment to anywhere on the globe by air, land, or sea. Powered by a dedicated, diverse workforce, the logistics enterprise underwrites the global lethality of the Joint Force, advances American interests around the world, and provides our nation's leaders with strategic flexibility, all while creating multiple cognitive dilemmas for our adversaries.

By maintaining favorable global posture, sufficient transportation capacity, and the ability to command and control global mobility operations, USTRANSCOM secures the Joint Force's ability to project an immediate and credible force required to meet US strategic objectives. America now, however, faces direct challenges across all domains. Our adversaries clearly recognize the United States' ability to rapidly scale and deliver the Joint Force globally as a strategic comparative advantage, and they are actively attempting to degrade or deny our ability to project power. If we are to maintain this advantage for our nation, we simply must evolve for tomorrow.

USTRANSCOM Tomorrow

America's challengers are competing through all instruments of national power and posturing to gain a positional advantage across all domains. They are using economic, diplomatic, and technological power to coerce other nations, challenge the stable and open international system, and attack democratic principles. Even more concerning, America's homeland is now no longer a sanctuary; force elements may have to "fight to get to the fight." To maintain our strategic advantages, the JDDE must overcome this complexity.

Evolving for the future starts with understanding the fundamental difference between logistics and maneuver. Webster's dictionary defines logistics as "the aspect of military science dealing with the procurement, maintenance, and transportation of military materiel, facilities, and personnel."² Contrast this definition of logistics with the Joint Staff definition of maneuver: "the employment of forces in the operational

2. Merriam Webster Collegiate Dictionary, 10th ed. (1998), s.v. "logistics."

area through movement in combination with fires and information to gain a positional advantage in respect to the enemy.”³

Arguably since World War II, mobility operations have been largely focused on efficient logistics. As an example, compare Operation Allies Refuge operations to the Battle of the Atlantic during the war. Although still very difficult, Operation Allies Refuge was a logistics problem, an uncontested movement of personnel, albeit with some key constraints. In contrast, the Battle of the Atlantic was textbook maneuver.

By fully integrating armed escorts (fires) and utilizing broken secret German communications (information) to avoid enemy forces, the Allies were able to maneuver forces and supplies from North America to Europe and ultimately deny German U-Boats from accomplishing their mission. Just as this integration of maneuver with fires and information turned the tide in Western Europe, a renewed focus on maneuver will also ensure the JDDE provides the strategic advantage required for future contested logistics environments.

With the reemergence of strategic competition, we must also further evolve our thinking of maneuver concepts to include elements and domains not previously considered, such as space, cyber, and the electromagnetic spectrum. Maneuver in competition below the threshold of war is redefining traditional battlefield boundaries.

USTRANSCOM’s ability to command and control mobility forces is contingent on secure networks and continuous IT and platform modernization efforts to retain the advantages needed in the cyber and space domains. America’s competitors recognize this fact and are actively maneuvering in these nontraditional spaces, to deny, disrupt, and degrade our mobilization and force projection capabilities. As a warfighting combatant command, USTRANSCOM must remain agile enough to shift modes, nodes, and routes and be resilient enough to meet the volume and tempo of warfighters’ demands. Further, resilient, agile, and integrated command and control allows us to overcome mission disruption and maintain decision advantage, which are essential to enabling Joint Force operations at the speed of need.

As a critical part of the maneuver force, USTRANSCOM must face these realities. The mobility enterprise must evolve to be fully integrated with all war-fighting functions. The defense industrial base, commercial industries, and the United States military need to be unified in effort and purpose. Even more so, true global integration is critical and requires the deliberate integration of all 11 combatant commands with every government branch. This must be a united, concentrated effort as we operate hand-in-hand with our Allies and partners. From initial planning to end-state achievement, we must collaborate throughout all phases. This integration is underpinned by shared, trusted data and a suite of analytic capabilities to enhance agile and effective decision making at echelon.

Equally important to evolving concepts is the evolution of our mindset. The success of USTRANSCOM’s warfighting framework and the JDDE’s ability to project combat

3. Chairman of the Joint Chiefs of Staff (CJCS), *Joint Operations*, Joint Publication 3-0 (Washington, DC: CJCS, October 22, 2018), III-38.

power are underpinned by our collective ability to innovate and overcome formidable problems. Maintaining deterrence requires the Joint Force be biased to action, setting conditions for a forward-looking and forward-leaning posture. To do so, it is imperative that we develop a competitive mindset—hungry, determined, and focused.

A workforce with a competitive mindset is continually creating advantages for tomorrow by innovating and experimenting with more effective ways to operate. A competitive mindset encourages imaginative ideas and challenges antiquated concepts and processes. It develops a resilient force that has the courage to take disciplined risks and accept lessons of failure as learning opportunities. Competitive leaders link their mission to national objectives and empower others with commander's intent. Competitive thinkers value continued learning and self-improvement to ward off obsolescence. Competition sets the conditions for innovation, creates advantages, and enables faster, more effective decision making. A competitive force keeps pace with emerging challenges and evolves to meet the needs of tomorrow.

Conclusion

Just as Helfin argued 75 years ago, we must confront the rapidly changing methods of waging war. Time is of the essence; we cannot cling to yesterday's successes. Logistics in a contested environment necessitates a renewed emphasis on maneuver and an evolution of how we apply the concept across domains. Furthermore, we must develop a competitive mindset to maintain advantage in this rapidly changing strategic environment. It is evident the traditional methods of today are not sufficient to solve the new and complex challenges of tomorrow. In 1947, President Harry Truman stated "America was not built on fear. America was built on courage, on imagination, and an unbeatable determination to do the job at hand."⁴ Together, we will rise to meet these complexities; the Total Force and our partners possess the talent and capabilities to overcome any challenge. Together—We Deliver! Æ



General Jacqueline Van Ovost, USAF

General Van Ovost is the commander of United States Transportation Command.

4. Harry S. Truman, *Special Message to the Congress: The President's First Economic Report*, Harry S. Truman Library (website), January 8, 1947, <https://www.trumanlibrary.gov/>.

AFTER DEFEAT

A TIME TO REBUILD

S. CLINTON HINOTE

We lost people, we lost aircraft, we lost a campaign, we lost prestige, but we did not lose forever. It is time to look beyond the sense of finality that comes with defeat. We can decide not to lose. After suffering tremendous moral and physical attrition, it is time to rebuild. We cannot waste this crisis. We must implement the necessary changes to be victorious, next time.

I am often asked: “What keeps you up at night?” The answer is simple. We know that we must change, but the internal and external forces opposing change will not allow it, and we lose. We lose aircraft. We lose Airmen. We lose a campaign. We lose the confidence of our friends and the respect of our foes. Then, those of us who remain have to put the defeat behind us and rebuild.

No one wants to discuss the possibility of defeat. In our military careers, we are told repeatedly that “failure is not an option.” Unfortunately, as a nation and as the Department of Defense, we have been unable to enact real change. When that fact is combined with our poor record of matching military means with political ends, failure becomes possible. Ignoring that possibility will not make it go away.

The following is a fictional work set in the future. It explores the possibility of failure, why it might happen, and how we might respond. It is intended to help us think about the future we are building for tomorrow’s Airmen and what we might do now to help them succeed.

“Accelerate change or lose.” In retrospect, General CQ Brown’s words cut deep—both a warning unheeded and an opportunity unanswered. We knew we had to change. We tried, but we did not . . . not enough at least. So we lost. And here we are—picking up the pieces, burying the dead, and experiencing the shame. America loves winners. America hates losers. That is what we are, at least in this moment. It hurts. I feel ashamed. We have worked hard to provide the next generation a winning Air Force, just like others did for us. Our predecessors succeeded. We failed.

We must move forward, but before we can, I need to reflect on where we have been. Are we in the middle of the story or at its end? Because this defeat feels final.

The Postmortem

My mind is filled with so many questions: Why could we not change? Did we see the danger in time, or was it too late? What could we have done differently? Undoubtedly, many factors contributed, both internal and external. Taken together, they hindered us from appreciating the extent to which our military advantage had eroded. Once we did see it, we could not change fast enough to make a difference.

After the Vietnam conflict, our damaged and depleted military was rebuilt by courageous and committed leaders—a major factor in an unexpected close to the Cold War.¹ Along with this shock to the international system, the Persian Gulf War proved to be a turning point, both for us and for our adversary. For us, it represented vindication and triumph. Aerospace power showed itself as decisive as any form of military power, and much less costly than most. Our forces were tactically and operationally brilliant, employing a mix of precision firepower with intelligence and communications that allowed our forces to dismantle a state in short order.

Even more impressive, however, was our logistical system that moved and sustained our force. It is hard to overstate how complete our victory felt at the time. Yet we would eventually realize the operational success of Desert Storm was not a victory at all. The indecisive end to the military operation led to years of pseudo-war, keeping us mired in the Middle East, draining our attention, depleting our resources, and engendering resentment. At the time, however, we felt an overwhelming sense of relief and elation. Hubris would follow close behind.

Our adversary took notice. Their military strategists studied our success and began conceptualizing a military that could stand against our preferred way of war. It must be acknowledged that, at a time when their GDP was barely 7 percent of ours and poverty was rampant, they conceived of a plan to assert control of their fate and began to execute it.² As we look back, we must acknowledge the power of their belief. It is one of the many things that makes them a worthy rival.

As our adversary resolved to build their military for confrontation, we spent much of our attention and resources in the Middle East. I can remember patrolling the no-fly zones in Iraq and marveling at how much time, effort, and money we were willing to spend to keep the Iraqis from flying over their own territory. This occurred during the time of the First Austerity.

After the Gulf War, there was great hope for a “peace dividend.” From 1988 to 1997, the US military budget decreased by 30 percent in real terms.³ When democracies face austerity, their militaries tend to gravitate to the same things: they cut force structure, they defer modernization, or they do both, because that is where the real money is.

1. See James Kitfield, *Prodigal Soldiers* (Washington DC: Brassey's, 1997).

2. Roger Cliff, *Anti-Access Measures in Chinese Defense Strategy* (Santa Monica, CA: RAND Corporation, January 27, 2011), <https://www.rand.org/>.

3. Congressional Budget Office (CBO), *Illustrative Options for National Defense under a Smaller Defense Budget* (Washington, DC: CBO, October 2021), 6.

This was certainly true for the Air Force. In 1989, there were approximately 571,000 active-duty Airmen. By 2000, this number had decreased to just over 357,000.⁴ At the same time, our leading modernization programs—the C-17, B-2, and F-22—kept slipping “to the right.” Both the B-2 and F-22 programs would be severely truncated below what would be needed against our adversary, although we did not understand it at the time.

In reality, there was little pressure to modernize.⁵ We enjoyed a high degree of overmatch over adversaries in plausible scenarios, as was illustrated in NATO’s intervention in Kosovo and the subsequent air war over Serbia where aerospace power achieved the political objective, losing only two aircraft in over 35,000 sorties.⁶

Moreover, the essential linkages between air and space were proven through the combination of intelligence, surveillance, and reconnaissance, precision navigation and timing, global satellite communications, plus aircraft and weapons that could take advantage of all of these. It was a magnificent performance by a professional military in limited war. To many, warfare itself appeared to be changing, with the new sense of possibility captured by the word *transformation*.

Then came 9/11, and the world changed again. It was a shocking event that would burn into our psyche. I remember feeling ashamed then, too. I was ashamed that our powerful military and numerous intelligence activities had not prevented the attack. For those of us serving at the time, I think this brought on a crisis of conscience. We appeared to be focused on the wrong things. Our magnificent military was capable of dismantling states, but a state did not attack us.

As they say, when all you have is a hammer, everything looks like a nail. Our first response, therefore, was to dismantle a state, if that is what you considered Afghanistan under the Taliban. Aerospace power played a decisive role in that operation too, with our precision firepower called down from the heavens by special tactics teams working with our rebel allies. Our aerospace power gave us the advantage, and the Taliban quickly realized they could not survive as a fixed force. Instead, they retreated into the vast terrain and rediscovered their martial roots. Importantly, we (along with our Allies and partners) decided to assume the role of protector and nation builder, and thus began Occupation #1.

Almost as soon as the Taliban government fell, we began planning for the take-down of Iraq and Saddam Hussein, another nail for our hammer. I was personally involved in planning, and I now look back with a sense of great dissonance. On the one hand, the initial invasion of Iraq was one of the finest military operations ever executed. Our sanctions and policing over 12 years had crippled the Iraqi military, and the invasion was a combined arms masterpiece that leveraged a limited number of ground forces with massive amounts of aerospace power and logistics to move quickly to

4. “USAF Almanac: The Air Force in Facts and Figures,” *Air Force Magazine* 83, no. 5 (May 2000): 55.

5. See Michael E. O’Hanlon, *The Plane Truth: Fewer F-22s Mean a Stronger National Defense* (Washington, DC: Center for Strategic and International Studies, September 1, 1999).

6. O’Hanlon, *The Plane Truth*.

Baghdad. Entire armies were wiped off the map within hours of contact, and at the same time, we executed a full systemic attack of the Iraqi state. The result: systemic paralysis, just as John Warden predicted.⁷

Unfortunately, there was a day after, and we had no executable plan. I remember receiving the full operations plan brief in the months leading to the invasion, including hundreds of detailed slides. When the brief got to the phase for consolidation and peace building, however, there was an “under construction” sign. That was it. In the remaining months before the campaign kicked off, I never saw any real planning for rebuilding Iraq after the invasion. More than once, I heard people say, “that is State’s job.” That is how Occupation #2 began, with predictable results.

It could have been so different. At the policy level, the initial phases of the Afghanistan War were necessary given the 9/11 attacks, but the occupation was a choice. Moreover, both the Iraq War and the subsequent occupation were choices.⁸ I will not debate the merits of those choices here, except to say they had far-reaching consequences. Supporting these occupations would be the preeminent problem for the Department of Defense for the next 20 years, and because aerospace power was so valuable, large amounts of it would be dedicated to the efforts. Since we did not have an Air Force that was tooled for irregular warfare at capacity, we dedicated our front-line fighters, bombers, tankers, and intelligence, surveillance, and reconnaissance aircraft to the daily struggle of insurgency and counterinsurgency. There was never a break, ever.

Defense budgets went up during these years, but we should be clear about what that meant. We spent massive amounts on current operations, including an expensive network of bases in the Middle East with the logistics and contract support to keep them going. We built a massive enterprise around the Predator and Reaper aircraft, which we scaled to the limit of our ability to support. We flew our aircraft incessantly and expended weapons at unprecedented rates.

What we did not do was modernize. With the focus on winning the war we were in, the extant crises crowded out future investments. This became our Second Austerity. Essentially, the heavy imbalance toward supporting the occupations—an imbalance that affected both resources and the attention of DOD leaders and planners—left little room for reinventing our Air Force and our broader military, despite massive technological shifts that were transforming warfare itself. When then-Secretary of Defense Robert M. Gates accused the Air Force of “next war-itis” and decapitated its leadership, his message was clear and forceful.

I have noticed too much of a tendency towards what might be called “Next-War-itis”—the propensity of much of the defense establishment to be in favor of what might be needed in a future conflict. . . . But in a world of finite knowledge and limited resources, where we have to make choices and set priorities, it makes sense to lean toward the most likely and lethal scenarios for our military. And it is hard to conceive of any country confronting the United States

7. John A. Warden III, “The Enemy as a System,” *Airpower Journal* 9, no. 1 (Spring 1995).

8. See Richard N. Haass, *War of Necessity, War of Choice*, (New York: Simon and Schuster: 2009).

directly in conventional terms—ship to ship, fighter to fighter, tank to tank—for some time to come.⁹

In retrospect, it is clear we spent a lot of time, money, and leader bandwidth in the occupations, with little return on that investment. At the same time, we did not invest enough in new equipment or in the development of new war-fighting concepts. Yet the occupations were choices, and these insurgencies would never become a strategic threat to the United States. The true strategic threat lay in the consequences of those choices, particularly the high opportunity cost incurred. At a time of relative peace and prosperity, we could have used our time and resources to invest, develop, retool, and prepare. Instead, we doubled down on a bet we were likely to lose.¹⁰ In my opinion, the seeds of our defeat were sown in Afghanistan and Iraq.

As we committed this strategic error, our adversary took advantage. Its efforts to negate our preferred way of war began to bear fruit. The adversary began to field military capabilities designed to challenge information superiority, deny operational sanctuary, and attack key nodes such as ports, airfields, and fuel storage—assets critical to our preferred fighting concepts.¹¹ These included “carrier killer” ballistic missiles along with increasing numbers of modern cruise missiles, warships, aircraft, anti-satellite, and electronic warfare systems.

Additionally, the adversary executed a masterful incremental strategy in the South China Sea, building military bases and expanding its area of control. The west hoped international norms would slow this advance, but with no enforcement mechanism, they did not.¹²

While our adversary focused on achieving its strategy through a specific conceptual approach, we remained unfocused. Our strategic guidance at the time failed to set real priorities or make difficult choices. For example, the 2014 Quadrennial Defense Review contained expansive aims but little more than vague discussions of attendant risk.¹³ We had become so accustomed to being dominant in warfare that we made the mistake of thinking we could do everything (or most things) with acceptable risk. In reality, we focused on the crisis of the day, which was usually violent extremism, especially in Iraq and Afghanistan, but also in Libya, Syria, and the Sahel. Every once in a while, North Korea or Iran would act up just enough to steal our focus but not enough to provoke a forceful response.

9. Robert M. Gates, “Remarks to the Heritage Foundation,” delivered on May 13, 2008 in Colorado Springs, CO.

10. See Douglas Olivant, “Gates: What He Really Thought about the Afghan War,” The South Asia Channel, *Foreign Policy*, February 6, 2014, <https://foreignpolicy.com/>.

11. Christopher M. Dougherty, *Why America Needs a New Way of War* (Washington, DC: Center for a New American Security, June 2019), 32–33.

12. Hal Brands and Zach Cooper, “Getting Serious about Strategy in the South China Sea,” *Naval War College Review* 71, no. 1 (2018).

13. Chuck Hagel, *Quadrennial Defense Review 2014* (Washington, DC: Office of the Secretary of Defense, March 4, 2014), <https://www.acq.osd.mil/>.

At the same time, in what the late Senator John McCain called the military-industrial-congressional complex, the focus was stovepiped and disjointed. Many DOD leaders concentrated on their specific piece of the puzzle, usually to the detriment of the whole. One of the defining characteristics of the Department in this period was an incredible diffusion of power and decision-making authority. For each of these power centers, it was much easier to veto a threatening proposal for change than to make progress in high-end warfighting.

This was especially true for the combatant commanders. Their short-term focus drove their recommendations and decisions, with no real counterbalance in place. In addition, there were key leaders at each agency, service, and secretariat that opposed real change because it would come at the expense of their short-term priorities. Importantly, almost all of them found allies on Capitol Hill, where many lawmakers focused on defending their local interests, especially those of the units and bases in their states and districts, plus the defense industries that provided jobs. For their part, these defense companies focused on the incentives in front of them. The money was in current operations and sustainment. In comparison, betting on modernization programs was a crashout that seldom paid off in the Second Austerity.

Then came sequestration. Looking back, these mindless cuts represented the nadir of what James Mattis called our “strategy-free environment;” he was right when he testified about sequestration: “no foe in the field can wreak such havoc on our security.”¹⁴

In 2018, we began to recognize the danger posed by this toxic mix. In an unusual attempt at clarity, the Department crystalized the situation in a highly classified brief to Congress called “Overmatch” that presented the results of major wargames against both Russia and China in plausible scenarios. It was dismal and shocking to many.¹⁵ This was followed shortly thereafter by a new National Defense Strategy that finally set real priorities and made difficult choices. At its core was the message that we had entered a period of great power competition, and the focus of the Department needed to return to high-end warfighting.¹⁶ This hard-hitting document was highly praised, even in Congress, and it seemed to be the right strategy at the right time. Agents of change within the Department began to hope.

Unfortunately, that hope turned to cynicism when we failed to implement this strategy. There were many lost opportunities over the years, but this one sticks out to me. We had hard evidence to show we were losing ground, we had a good strategy to counter this, we had a growing consensus that change was necessary, and we even had

14. *Hearing to Receive Testimony on Global Challenges and US National Security Strategy, United States Senate Committee on Armed Services*, 114th Cong. (January 27, 2015) (87, 13) (statement of General James N. Mattis, USMC (Ret.)), <https://www.armed-services.senate.gov/>.

15. See Christian Brose, *The Kill Chain: Defending America in the Future of High-Tech Warfare* (New York: Hachette, 2020), introduction.

16. *Hearing on Implementation of the National Defense Strategy, United States Senate Committee on Armed Services*, 116th Cong. (January 29, 2019) (statement of Elbridge A. Colby, director of the Defense Program, Center for a New American Security), <https://www.armed-services.senate.gov/>.

some budget increases. Yet we could not develop a shared sense of urgency, and many leaders—internal and external—fought change with their soft vetoes and firm alliances.

This was when General Brown issued “Accelerate Change or Lose.”¹⁷ Despite this, we failed to make a convincing case, and our stakeholders did not buy in. We did not accelerate, and so we lost. And here we are—picking up the pieces, burying the dead, and experiencing the shame.

What Now?

Fortunately, this is not the end of the story. One of the most important lessons I have learned about strategy came from my professor at the School of Advanced Air and Space Studies, Dr. Everett Dolman. He argued that despite our professional education, we should not assume that a strategy consists of the “three-legged stool” of ends, ways, and means. Instead, he taught us that strategy, “in its simplest form, is a plan for attaining continuing advantage.”¹⁸

Moreover, he taught us that “strategy is not about winning,” because there is no true end state . . . there is always a day after.¹⁹ It is the continuing interaction that determines outcomes, a concept that Simon Sinek echoes in his book, *The Infinite Game*.²⁰ Dolman also highlighted a particularly insightful (and controversial) statement that Richard Hart Sinnreich—leader of the Army’s School of Advanced Military Studies—had the audacity to make in the *Washington Post*: “It’s not the winner who typically decides when victory in a war has been achieved. It’s the loser.”²¹

The first time I read those words, I did not believe them. Now, I am profoundly thankful that they are true. We lost people, we lost aircraft, we lost a campaign, we lost prestige, but we did not lose forever. It is a new day. Great strategists are able to see past the sense of finality that comes with defeat. We must now be great strategists. We can decide not to lose. Indeed, we must. After suffering tremendous moral and physical attrition, our job now is to rebuild. We cannot waste this crisis. We must implement the changes that we knew we needed. It is our one chance.

A Time to Rebuild

For the next phase of the contest with our adversary, it is likely our political leaders will tell us to do the following, in priority order:

1. Defend the people of the United States, our territories, and our interests by deterring further attacks in air and space. Our defeat will be interpreted as weakness.

17. Charles Q. Brown Jr., *Accelerate Change or Lose* (Washington, DC: Department of the Air Force, August 31, 2020).

18. Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space and Information Age* (New York: Frank Cass, 2005), 6.

19. Dolman, *Pure Strategy*, 5.

20. Simon Sinek, *The Infinite Game* (New York: Penguin Random House, 2019).

21. Richard Hart Sinnreich, “Winning Badly,” *Washington Post*, October 27, 2003.

Our homeland has been attacked; Andersen is decimated, Pearl-Hickam is barely functioning, and our logistics systems are unusable. The threat of further attack will continue as we progress to low-grade, protracted conflict somewhere between war and peace. After decades of emphasizing offense, we must focus on defense and deterrence.

2. Rebuild security partnerships with our key Allies and partners. Our defeat will be interpreted as weakness. Many of our security partners will conclude they must bandwagon with our adversary or find some way to preserve neutrality. We must identify the security partners who are still with us and seek true security cooperation, not the parent-child approach we adopted during the last several decades. In this, we have no choice. We share core interests and are dependent on each other for prosperity and security. None of us can stand alone.

Aerospace power cannot accomplish either of these objectives alone, but it remains essential, perhaps more so than ever. Importantly, while we will continue to have separate Air and Space Forces, I remain convinced we cannot think of air and space as distinct and separate forms of military power. The arc of technological development is in the opposite direction, and if we allow the existing bureaucratic separation to grow into a conceptual one, others will be able to exploit this error. Indeed, this is what our adversary did. For this reason, we must think of *aerospace power* in the singular.

There can be no homeland defense without aerospace defense. There can be no deterrence without the ability to hurt our adversary through air and space. There can be no use of the global commons without the ability to project aerospace power. Our Allies and partners need all of these aerospace capabilities as well. In order to produce this military aerospace power, we must lead and influence our country's aerospace enterprise, in all its forms. This will also become our third objective below.

3. Rebuild our aerospace nation, and help our Allies and partners do the same. Our military aerospace power arises from a strong aerospace foundation across industry, government, and academia. We must use our influence to build holistic health and create positive incentives across these societal arenas.

Objective #1: Deterrence and Defense

Military power deters in two ways. It disables (deterrence by denial) and it hurts (deterrence by punishment). In modern conflict, there is no capability to deny or punish apart from access to air and space. In our most recent conflict, unfortunately, we were unable to project sufficient aerospace power to deny, and our threats of punishment through air and space were insufficient. We must address both sides of the equation.

Our nuclear forces did what they were supposed to do. They served as a backstop to all-out war with a peer. In fact, perhaps one of the few successes we can claim over the last decade is that we have been modernizing these forces. These were critical in the signaling between us and our adversary. They remain so today. One indication of the continued importance of nuclear deterrence is the choice several of our allies have made to field their own nuclear deterrent in the wake of our defeat. They would not do this unless they thought it was essential to their survival.

Despite this, it is clear nuclear forces are not enough to deter our adversary from attempting limited objectives, especially when there is an imbalance of interests between us. When the adversary cares about something more than we do, it is not enough to signal a vague threat of punishment that might include a nuclear response. It is just not credible. It was not for our adversary, and when it called our bluff, we were not willing to go there.

So as we go back to basics on what deters a peer adversary, we must acknowledge our conventional aerospace power was not enough to deter. This was especially true as we consider the fundamental reasons for our services' existence: superiority in air and space. The effectiveness of our entire Joint Force depends on air and space superiority, and we never established either one, at least not where it mattered. If we are to rebuild, this is where we must start.

Prior to the conflict, the Space Force was executing a plan to preserve the use of space assets while denying that use to our adversary. They were hamstrung, however, by a slow start due to policy concerns as well as the brittle architecture they inherited from decades of assuming space was not a warfighting domain. Our adversary intended all along to challenge our use of space, but it took too much time for our policy to catch up to this reality. When it did, we just did not have enough time or money to field capabilities adequate to defend the old architecture, especially against the combination of direct-ascent anti-satellites to geosynchronous orbit and directed energy from Earth's surface. As a result, we suffered attrition, and the brittle architecture broke down.

A similar story played out in the air domain. We became accustomed to the lightly contested use of the air, and we allowed the momentum of a failing approach to bring us down. Specifically, our approach was to field capable fighter aircraft (flown by highly trained pilots) at ever-increasing cost and ever-decreasing numbers. At the same time, our ability to maintain air awareness waned as the airborne warning and control system (AWACS) aircraft became unsustainable due to age, and we were not able to field a suitable replacement for the high-end fight.

There was a point where we explored fielding larger numbers of unpiloted aircraft as "loyal wingmen," but we did not go fast enough in this area. As in space, we were brittle to attrition, and we paid the price. When we could get to the fight, our pilots and aircraft did well, until they ran out of missiles and were overwhelmed.

We now have a clean sheet to rebuild air and space superiority through a system-of-systems approach that leverages capabilities in all domains. This will include developing domain awareness in new ways, especially as space assets are able to determine what is flying in the air and air assets can do the same for space. Communication links must be reliable and redundant, with global communication through space as the foundational capability supported by many others, including highly specialized and secure datalinks for aircraft.

Battle management will increasingly migrate to an all-domain capability conducted on behalf of the Joint Force commander. We should welcome this evolution, as it will allow us the flexibility to use other domains to achieve air and space superiority.

Warfighting effects can and must be employed across domains, as air platforms will be able to shoot into space, and space platforms will shoot in and through the air. Finally, both air and space forces must be more resilient to attrition. We should aim to exhaust or negate the adversary's number of weapons at acceptable cost, ideally less than it will cost the adversary to replace those weapons. This will require us to field much larger numbers of aircraft and spacecraft of various capabilities and price points.

Of course there are many other aspects to rebuilding, but we must start with these essential elements: a modern, resilient nuclear deterrent combined with the ability to establish air and space superiority to counter the ongoing threat of attack from our adversary. We must maintain the threat of punishment through our nuclear deterrent while also bolstering the threat of denial in air and space. Until the threat to our homeland abates, everything else is secondary. Moreover, the ability to project superiority into the air and space is essential to reestablishing widespread use of these commons, a condition that will be critical to rebuilding transportation flows across the global economy. But we cannot do this alone.

Objective #2: True Partnerships

Our global system of partnerships and Alliances has been severely challenged in the aftermath of our defeat. We spent decades building that system, but the nations of the world, and especially the nations of Asia, are now torn between the options of balancing against or bandwagoning with our adversary. For many, fear and uncertainty will drive bandwagoning behavior—or at least a move toward neutrality, which will require deemphasizing security cooperation with us.

Some will make the courageous choice to balance, however, at least for the time being, and we must give these allies a reason to continue close cooperation with us. If we cannot do this, we can expect two results: the collapse of the balancing coalition in Asia, and the establishment of a hostile hegemon there.²² It is not an overstatement to say that the long-term conflict between us and our adversary will be decided according to the perceptions of the third-party states forced to choose between us. Accordingly, we must leverage the common need for aerospace power to encourage these states to continue security partnerships with us.

We will do this through several lines of effort. First, we will develop shared awareness of the security environment with our allies. In our world, information continues to grow in value. An understanding of the security environment is a critical form of sovereignty for our allies. We will codevelop systems that gather information across the globe—at all classification levels—and convert this information into shared understanding through powerful technological tools. The goal will be to build on this understanding to increase trust and achieve a common framework for collective action.

22. Elbridge A. Colby, *A Strategy of Denial: American Defense in an Age of Great Power Conflict* (New Haven, CT: Yale University Press, 2021), 118.

Second, we will conduct integrated defensive planning with our allies. Just as defense and deterrence is the priority for us, this is true for our allies as well. One of the most effective ways to work together is to conduct detailed defensive planning with them. This raises the credibility of our collective defenses and, therefore, their deterrent value. This is especially true if the planning can take advantage of new capabilities that we develop and field together . . .

Third, we will codevelop defensive capabilities that are both effective and interoperable. We have allowed a limiting paradigm to harm our security cooperation with our most capable allies. We were the world leader in foreign military sales for so long that we adopted a haughty mindset: we assumed we had the best stuff, and we were willing to sell it to you, but only if you complied with our rules (which in some cases meant giving up aspects of your sovereignty). Plus you needed to pay a premium for the privilege.

Unfortunately, this approach limited the opportunities to codevelop capabilities with our closest allies, some of whom were surpassing us in their technological prowess. It is time to leave that approach behind. We now have an opportunity to codevelop elements of a shared defensive systems of systems. Numbers matter in the contest with our adversary and so does forward basing. Working together with key allies, we can field these capabilities in greater numbers, closer to where they will be needed. As an example, we should leverage the potential of large numbers of unpiloted platforms to blunt aggression by our adversary. The result will be a more credible threat of defense through denial.

Fourth, we will help our selected allies field a safe, secure, and reliable nuclear deterrent. In the wake of our defeat, some of our allies decided that they needed their own nuclear deterrent to protect themselves. In a better world, we would have wanted the established nonproliferation regime to continue, but that is not the reality. Accordingly, we have a common interest to help our allies field a deterrent using best practices in safety, surety, and reliability, which means sharing our data and lessons learned. Additionally, should the president direct, we must be prepared to conduct common planning with our allies to increase the credibility of our combined nuclear forces.

If we are to be successful in building a common defense, we must change our thinking. Our key allies are not “nice to haves.” They are essential for our own safety and security. We will either act accordingly or undermine our core interests.

Objective #3: Rebuilding the Aerospace Nation

The next phase of the conflict between us and our adversary will depend how our economies recover. At the moment, we have an opening, as much of the world is repelled by their aggression. Power is power and interests are interests, however. We must leverage every advantage while we can. One of those lasting advantages is our aerospace sector. It has been a remarkably durable element of the United States economy, and it remains so, despite our defeat. Our job will be to rebuild on this foundation, using our influence to strengthen the holistic health of the aerospace nation.

Military power—including aerospace power—springs from other forms of national power. In aerospace, military power arises from many related activities, including:

- advances in science and technology (including those driven by commercial incentives)
- companies that develop and invest in aerospace products and services
- markets for aerospace products and services, including emerging markets
- a free enterprise system that rewards the creation of value and protects intellectual property
- an educational system that inspires and develops young talent
- government oversight, with a balanced approach to preserving safety and creating opportunity

All of these came together to make us an aerospace nation. Fortunately for us, these elements are still in place, but our adversary is catching up. As military leaders in aerospace, we must cultivate an understanding of how scientific research, technological developments, market dynamics, and government regulation affect aerospace power. But this is not enough. We cannot be passive spectators in the advancement of aerospace—we must be active participants. We can use our influence as respected Airmen and Guardians to advance aerospace power in all its forms. It is the fastest and best approach to rebuilding—sustainable over the next several decades of challenge and conflict.

To be more specific, we must lead by leveraging our influence to incentivize:

- advances in science and technology (both military-specific technologies such as infrared countermeasures as well as dual-use technologies such as aircraft capable of high-speed vertical takeoff and landing)
- the growth of new aerospace markets (particularly with dual-use technologies, including affordable space launch and point-to-point logistics delivery through the air and space)
- balanced approaches to government oversight (especially where we have privileged the safety risk over the opportunity cost to our economy, such as with flying cars using electric vertical take-off and landing technology within the national airspace structure)

It is time to rebuild. As we heal, we must remember that we still possess many strengths and advantages. We have lost battles and even wars before, but we have learned from our shortcomings, reformed our institutions, and mobilized the creativity of our people. We must do so again. Our resources are finite, but they are considerable. Our situation requires focus and discipline, and perhaps that is easier to establish in the wake of defeat. We could not find this focus and discipline prior to conflict, and

After Defeat

our adversary took advantage, exerting control over its near abroad. Our adversary does not control our choices, however. Only we can choose to lose . . . or to win.

In this article, I have written about a future that does not have to happen. Unfortunately, it is becoming increasingly likely. Every day we fail to change is a day we move closer to potential defeat. Time is not on our side. I challenge you to think about what you would do if we lost. What recommendations would you make to rebuild? Then ask the really important question: why aren't we doing those things now? Æ

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SAILING THE NEW WINE-DARK SEA SPACE AS A MILITARY AREA OF RESPONSIBILITY

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The designation of a new military area of responsibility is highly significant change, denoting the major structural and functional differences between the current US Space Command and its predecessor, which existed between 1985 and 2002. A few propositions can guide our approach to accomplishing the command's Unified Command Plan responsibilities: the area NOT in the US Space Command AOR is the most special place in the cosmos; the word "global" cannot adequately describe the political/military range of national security considerations; the concept of key terrain must be reimagined in the domain; and the military space AOR has relevance for everyone.

Over the past two years, we have witnessed significant change in the space arena.¹ The United States and its Allies and partners have seen an exciting and almost exponential increase in commercial space while also witnessing their competitors expanding their presence and capability. These changes and our ever-growing dependence on space for everyday life led to the stand up of United States Space Command and United States Space Force. While their statutory responsibilities differ, both organizations focus on the protection and defense of space to ensure free and unfettered access to the domain and continued delivery of space-enabled capabilities to the terrestrial spheres.

The creation and delineation of these organizations mark a significant milestone for the future of human activity in space. Such inflection points, aptly characterized by historian Thomas Cahill as "Hinges of History" in his eponymous series of books, occur relatively infrequently, but always with dramatic effect. Cahill's central thesis is that history is not just linear but rather represents a set of punctuated events that could have taken history (and consequently, the future) in any number of directions. Decades

1. This article is an expansion on remarks delivered by Lieutenant General John Shaw at the Space Warfighter Luncheon, 2021 National Space Symposium, Colorado Springs, CO, <https://youtu.be/n6BY-axNklvA>. This article proposes two new English language words ("supraglobal" and "downwell"), and two new definitions to two existing words ("astrographic" and "upwell"). The authors wish to thank Dr. Andrea Van Nort (USFA English Department) and Colonel Luke Sauter (USFA Astronautics Dept Head) for their assistance in the development of these words and their definitions. The authors would also like to offer a special thanks to Mr. Andre Shappell for his invaluable assistance in reviewing the content of this article.

after landing a man on the moon, and after years of remarkable technological advancements inherent in harnessing the benefits of space-based assets, we are again facing changes so dramatic that they will fundamentally alter the geopolitical environment on Earth.

The fourth installment of Cahill's series, *Sailing the Wine-Dark Sea: Why the Greeks Matter*, details the Greeks' contributions to modern society, both good and bad. Cahill writes of Greek influence on art, philosophy, statecraft, culture, literature, architecture, poetry, and drama, among many other influences. He also writes extensively about the Greek influence on the modern way of war.² Throughout, Cahill emphasizes the significance of ancient history to events occurring today—an ode to the Greeks and how they built much of the foundation for our twenty-first-century civilization. Curiously, the book provides what could be the perfect model for describing the significance of contemporary inflection points in the development of the space domain.

At some point, were he to become enamored with these recent and fascinating changes in the space arena, Cahill might be compelled to write a new installment in his series, detailing the astonishing developments of the past couple of years as yet another hinge of history. One chapter might focus on China's destruction of their defunct weather satellite in 2007. Another could describe the logic behind the founding of the United States Space Force. With its organize, train, and equip responsibilities, the newly formed service will usher in an era of space-based capabilities focused on ex-geosynchronous operations that would not have proliferated otherwise.

Yet another chapter could focus on the establishment of the new US Space Command. Space operations already naturally serve as global integration activities. Space effects intended for one geographic area are likely to influence, if not directly alter, other areas. So when the entirety of Department of Defense (DOD) space operations, activities, and investments are aligned under the direction of a single combatant command, the capacity for integrating military space with disparate terrestrial military objectives drastically improves.

Were Cahill to ask, we would advise another chapter on a small clause written into the Unified Command Plan at the establishment of US Space Command. While the Unified Command Plan is the overarching document that details the major new mission responsibilities of US Space Command and its commander, one small, seemingly mundane section in it is revolutionary: the plan assigned US Space Command its own military area of responsibility (AOR).

Seemingly a minor detail, the designation of a new AOR is actually a highly significant change, denoting the major structural and functional differences between the current US Space Command and its predecessor, which existed between 1985 and 2002. We are only beginning to understand the potential of this change. A baseline definition and common understanding of what constitutes an AOR is fundamental to understanding why this change is so revolutionary.

2. Thomas Cahill, *Sailing the Wine-Dark Sea: Why the Greeks Matter* (New York: Random House, 2003).

Doctrinally, an AOR is defined as “the geographical area associated with a combatant command within which a geographic combatant commander has the authority to plan and conduct operations.”³ But the idea of an AOR predates Joint publications significantly. For millennia, AORs have been used as a way for armies, nations, or empires to divide geographic areas of national interest. Identified AORs have certain characteristics and have always been defined by lines on a map. These lines are dictated by a number of factors such as terrain, political context, demographics, and most importantly, threats. Ideally, the sum of all assigned AORs and operations within them meets the strategic objectives of the army, nation, or empire that created them. Areas of operations are not stovepipes, as they are meant to contribute to the attainment of a holistic grand strategy.

Several historical examples of military AORs provide insight into their creation and value. In his account of the pacification of Gaul, Julius Caesar penned probably the most famous AOR in literature. He started this famous work with “Gaul as a whole divided into three parts.”⁴ In particular, Julius Caesar’s justification for *why* Gaul was divided into three parts is of interest: it was fundamentally about terrain, different rule of law, and threats.

Caesar took great care to identify the differences in proximity to Germanic territory, natural territory borders, and the courage of the different factions in each AOR. Together, the combined AORs of Gaul served as a strategic buffer between Rome and the Germanic tribes. In fact, one of the first military objectives Caesar personally recalled in Gaul was to return the Helvetii, a tribe of Gaul, to their native lands to deter the Germanic tribes from crossing the Rhine.⁵ By geographically separating Gaul into three areas, Caesar gave his subordinate commanders responsibility for governing each region separately but with a common cause in mind. The most important aspect of Caesar’s pacification of Gaul may be the fact that he never mentioned one AOR being more important or influential than the others; they were all equally important to the successful completion of his campaign.

A more modern example familiar to World War II history enthusiasts is the Pacific Theater during that conflict. Though today’s singularly defined United States Indo-Pacific Command AOR is the largest US terrestrial geographic theater, the Pacific Theater in World War II was actually divided into two AORs. The Southwestern section consisting predominantly of large land masses was given to General Douglas MacArthur, and the section comprising wide areas of open ocean, the Central Pacific, was given to Admiral Chester Nimitz.

While MacArthur completed an island-hopping campaign mainly threatened by land-based airpower, Nimitz conducted a naval campaign against a formidable Japanese carrier force and its attendant sea-based airpower. Although this approach was

3. Chairman of the Joint Chiefs of Staff (CJCS), *Doctrine for the Armed Forces of the United States*, Joint Publication-1 (Washington, DC: CJCS, 2017), GL-5.

4. Julius Caesar, *War Commentaries: De Bello Gallico* (London: Dutton, 1953), 11.

5. Caesar, *War Commentaries*, 28.

criticized for disaggregating limited Allied resources, it required the Japanese to disperse their defensive forces.⁶ MacArthur focused on isolating key terrain with strong Japanese military presence while securing less-defended islands on his path toward Japan.⁷ Between the Battle of the Coral Sea and the Battle of Midway, Nimitz diminished Japanese carrier fleet capabilities, resulting in relative freedom of maneuver for Allied maritime forces in the Pacific.⁸ By enabling bombing missions from the Marianas and restricting commerce and resupply through control of the seas surrounding Japan, both AORs proved necessary to achieve victory against the Japanese.

In these past cases as in the present, the 2019 Unified Command Plan assigned an AOR to US Space Command to protect a critical area for national security. This is not unlike the rationale for the division of the Pacific region into two AORs in World War II. But the application of the AOR concept to space presents its own unique set of challenges. Space is significantly different from any previous AOR. For the first time in military history, a military AOR is not defined by geographic lines on a map. In fact, the etymology of the word geographic is Greek and means “drawn on the earth.”

In light of this key distinction, a better term defines the US Space Command AOR: astrographic, which means “drawn on the stars.”⁹ All other combatant commands’ AORs are defined by latitude and longitude lines on a map or geographic features. United States European Command is responsible for continental Europe and its proximate bodies of water. The AOR assigned to US Indo-Pacific Command roughly covers the southern Asian continental landmass, southeastern Asian nations and associated waters, and the Indian Ocean.

Defined in a novel manner, US Space Command’s AOR is the space beyond 100km of altitude above the mean surface level of the earth—indescribably vast. And while 100km might sound like a random, albeit straightforward round number, it was not an arbitrary selection—100km is the Kármán Line, defined as the point that requires vehicles to exceed actual orbital speed at that altitude in order to generate lift.¹⁰ There may not be a more eloquent or scientifically based possible definition for the boundary between air and space.

As the ramifications of this new AOR for the nation are explored, a few propositions can guide our approach to accomplishing the command’s Unified Command Plan responsibilities: (1) the area NOT in the US Space Command AOR is the most special place in the cosmos; (2) the word “global” is increasingly insufficient to fully describe the political/military range of national security considerations; (3) the

6. Thomas E. Griffith Jr., *MacArthur’s Airman: General George C. Kenney and the War in the Southwest Pacific* (Lawrence: University Press of Kansas, 1998), 49.

7. Griffith, *MacArthur’s Airman*, 235.

8. Craig L. Simmons, *The Battle of Midway* (New York: Oxford University Press, 2011), 184–85.

9. This represents a new definition of astrographic developed in part by the authors. It is an adjective meaning drawn on the star or an area defined by boundaries or features in space.

10. Eric Betz, “The Kármán Line: Where Does Space Begin?,” *Astronomy*, March 5, 2021, <https://astronomy.com/>.

concept of key terrain must be reimaged in the domain; and (4) the military space AOR has relevance for everyone.

Proposition Alpha Prime

The area NOT in the US Space Command area of responsibility is the most special place in the cosmos.

The place in the universe not covered by the space AOR, that is, 100km of altitude and down—approximately 1×10^{-24} percent of the known universe—is the most special place in the cosmos and will remain so for millennia to come.¹¹ We do not explore space simply for the sake of exploring space; we do it for the benefit of humankind. And those humans live on Earth. It is critical to remember this fact. Human activity in space starts below 100km, and these operations and efforts certainly apply to US Space Command.

The command must ensure it delivers capabilities to Joint warfighters outside the space AOR and to human society at large. Earth is where every human was born and where most humans have remained except for about 600 individuals lucky enough to spend time in space (most just slightly above the Kármán Line). Proposition Alpha Prime will hold firm as humans continue to explore, even when spacefaring nations begin to visit other planets.

Proposition Two

The word “global” is increasingly insufficient to fully describe the political/military range of national security considerations.

The Department of Defense has diligently endeavored in recent years to transcend regional thinking. When it comes to current operations, military professionals strive to focus on global competition and globally integrated operations. But viewing operations on Earth without accounting for the vast AOR assigned to US Space Command artificially constrains the perspective and considerations available to decision makers to accomplish a desired national security objective.

How might the Department remedy this? About 15–20 years ago, the word “supranational” was introduced to discuss threats that superseded the borders of nation-states. Given the command’s domain and responsibilities, a new term may be warranted: supraglobal, or those things that are relevant to military or political matters that encompass the globe and relevant activities in the space beyond it.

Though global can mean applied to the whole of something, the term is more commonly used in military circles to distinguish the needs of the entire Joint/combined Force from those that are regionally focused.¹² The English language does not have a

11. Calculated using the isotropy theory assumption that the universe is expanding in all directions at the same rate and recent estimations of current expansion radius.

12. *Merriam-Webster Online*, s.v. “global,” accessed December 22, 2021, <https://www.merriam-webster.com/>.

word that adequately conveys a sense of that which lies beyond the global terrain, but supraglobal could be a remedy. This term integrates the Department's current approach to globally integrated operations with the nascent idea of treating the space AOR as an operational domain linked to all of the terrestrial domains.

The concept of an AOR is actually quite new in the military space world. Prior to the establishment of the new US Space Command, United States Strategic Command had responsibility for space operations, but the AOR was not defined, nor was it defined for the original US Space Command. Military space missions under US Strategic Command were treated doctrinally as a functional combatant command and primarily provided transregional supporting capabilities to geographic combatant commands.

Since the new US Space Command has been given an AOR, the space domain can be defined as an operational domain with potential threats. Those threats are increasing, our reliance on space is expanding, and this dependence will not change anytime soon. The nature of military space requires a change of thought. Much remains to learn and understand: What is the key terrain of the domain? What are the maneuvers, needs, challenges, and potential realities of this domain? These questions lead to the next proposition.

Proposition Three

The concept of key terrain must be reimagined in the space domain.

Key terrain is a concept as old as warfare and requires nuanced conceptual thinking in different domains. In doctrine, key terrain is defined as "any locality, or area, the seizure or retention of which affords a marked advantage to either combatant."¹³ But such advantages are gained differently from one domain to another.

Because of vast elevation differences in the land domain, taking the high ground delivered decisive advantage for one's forces. In traditional naval operations, such elevation differences do not exist, and key terrain was more influenced by the tides, currents, and maritime chokepoints. When airpower became a military domain in the early twentieth century, key terrain for the air was determined by the range forces could travel, or maintain lift, versus explicit terrain features. What does this mean for the space domain? A strong argument can be made that the natural differences in the physical environments between space operations and terrestrial operations are greater than differences in operations between the terrestrial domains.

In space, the energy required for movement and maneuver differs from that of terrestrial operations; moving toward and away from the earth is not as simple as moving downhill and uphill, respectively. For example, it takes essentially the same amount of energy to move from circular geosynchronous orbit (GEO) to circular medium Earth orbit (MEO) as it takes to move from circular MEO to circular GEO, which is very different from experiences such as hiking up and down a mountain on Earth.

13. Chairman of the Joint Chiefs of Staff (CJCS), *DoD Dictionary of Military and Associated Terms*, s.v. "key terrain," (Washington, DC: CJCS, November 2021), <https://www.jcs.mil/>.

Using human intuition to describe such movements in space can be contrary to physical reality. When discussing China destroying its defunct weather satellite in 2007 or Russia's direct-ascent antisatellite test in 2021, the inference most people make, based on the popular description of those activities as "shooting a satellite down," is not accurate. If either nation had in fact "shot it down," the world would not be having to cope with thousands of pieces of debris still in orbit from those events. "Shooting something down" in space is not an accurate description. What actually occurred is significantly worse.

So how can maneuver, and by extension key terrain, in space be better visualized? Terrain in the space domain is best described by those beautiful Einsteinian curves in spacetime known as gravity wells. Generally speaking, a gravity well describes the amount of force celestial bodies exert on objects in space.¹⁴

The space domain is home to many gravity wells. In practical terms, space operations planners must account for movement within the Earth gravity well, the combined Earth and moon gravity well, and within the sun's gravity well. Similar to maritime reliance on tides and currents before the invention of the steam engine, the majority of movement in space is largely dictated by gravitational forces and initial momentum (at least until another offset in space energy and propulsion is realized). As such, positions that provide advantage, or key terrain, will remain connected to these natural forces due to limited energy alternatives. For the foreseeable future, military, civil, and commercial actors in space will be required to plan and budget for future space operations with this constraint in mind.

A helpful way to describe the connection of gravitational energy to movement and maneuver between orbits is to use the terms "upwell" and "downwell," as either verbs or adjectives. Upwell can be defined as a verb (to increase orbital energy within a gravity well), an adverb (in the direction of increased orbital energy within a gravity well), or as an adjective (in a position of increased orbital energy within a gravity well). Downwell can be also be defined as a verb (to decrease orbital energy within a gravity well), an adverb (in the direction of decreased orbital energy within a gravity well), and as an adjective (in a position of decreased orbital energy within a gravity well).

Adding the definition "increasing orbital energy within a gravity well" to "upwell" is sufficient, but "downwell," or "decreasing orbital energy within a gravity well," is not a currently recognized word in the English language. Still, these proposed words and definitions would better capture the unique relationship of movement and energy in the space domain.

By connecting movement in space with the energy necessary to accomplish it, operations in the space domain would be differentiated from the common understanding of movement in the land, sea, and air domains. Such separation is necessary to adequately identify and communicate the unique aspects of space movement and maneuver and the resulting key terrain. As we increase the understanding of domain

14. Northwestern University, "Space Environment: What Is a Gravity Well?," Northwestern University (website), <https://www.qrg.northwestern.edu/>.

specifics, a wider range of actors will acknowledge the complexity of operating in the US Space Command AOR and its value to the nation and broader international community.

Proposition Four

The military space area of responsibility has relevance for everyone.

The ways in which US Space Command, with the help of its service components, operates within the AOR is relevant to all activity in space. At a baseline level, the AOR directly enhances Joint and combined operations across the globe and beyond. Indispensable capabilities such as missile warning; position, navigation, and timing; environmental monitoring; and satellite communications allow forward-deployed forces to carry out missions with lightning precision across multiple domains. Space-based nuclear command, control, and communications systems are bedrocks of the nuclear deterrent our nation relies on to prevent catastrophic attacks on the homeland. Domain awareness yields a thorough understanding of actions and intent in the AOR to minimize unintended consequences or miscommunication with other spacefaring actors.

Competitors see the military benefits of US space-based capabilities and are rapidly moving to close the advantage gap. Over the last decade and a half, the United States, its Allies, and partners observed as weapons testing in the domain created challenges for responsible space activity and freedom of action in, from, and to space. With a designated AOR, however, US national leadership enabled unity of effort in space to deter aggression and deliver superior space combat power in the event deterrence fails. United States Space Command will protect and defend this AOR and hopes potential malign actors are watching. And while relevance of the command's AOR to military operations might be considered a given, its benefits extend much further in scope.

The general population of Earth benefits as well, even if most people may not be aware of it. Nearly every person across the planet is an end user of space capabilities, and day-to-day life activities are protected by the formation of the AOR. Since its inception, the global positioning system (GPS) has enabled over \$1.4 trillion in US economic benefits.¹⁵

Whenever people visit a gas station and pay at the pump or use an ATM, they are using space. Seafaring maritime traffic utilizes position, navigation, and timing data to deliver goods from overseas ports to local stores and retailers. Farmers use space assets to optimize crop outputs, lowering produce costs at the grocery store, and people are able to near-instantaneously converse across the planet due to satellite communications. Organizing US military space capabilities to work together in the AOR allows the Joint Force to identify threat indicators and proactively protect myriad GPS quality-of-life enhancers.

15. National Oceanic and Atmospheric Administration, Office of Space Commerce, *DOC Study on Economic Benefits of GPS*, Office of Space Commerce (website), <https://www.space.commerce.gov/>.

Similarly, members of the commercial space industry should be interested in the formation of the US Space Command AOR. In 2020, the global space economy increased to \$447 billion with approximately 80 percent of the total due to commercial endeavors.¹⁶ By some estimates, another 17,000 satellites will be launched by 2030, most with commercial origins.¹⁷ With a myriad of new commercial space assets projected in the near future, the command's ability to accurately depict the space operating environment and avoid debris-causing collisions will be foundational in creating predictable conditions for sustained business growth in the domain.

Throughout history, maritime merchant traffic operated with more confidence knowing a navy was close by to keep things safe and transparent. Similar conditions must be fostered for safeguarding space commerce. Currently, DOD space assets provide early warning of potential collisions and notify affected commercial entities, reducing the chance of orbital debris or mission failure. By assigning all relevant terrestrial and on-orbit space domain awareness sensors to US Space Command to protect the AOR, the Department of Defense has optimized detection capabilities that protect one of our nation's biggest advantages—commercial-sector innovation.

Finally, civil organizations like NASA benefit from having a single DOD organization responsible for ensuring safety, security, and stability in space. The Artemis Program will carry astronauts to the moon for the first time in 55 years, followed by an eventual crewed mission to Mars. Originally signed in 2020, the NASA-sponsored Artemis Accords provide a common framework to usher in a new era of space exploration. Signatories affirmed several items conducive to cooperative space exploration including shared access to scientific data gained, the pursuit of interoperable space technologies, and transparent notification for areas of harmful interference.¹⁸

As civil organizations from the international community expand human presence further into the AOR in the name of peaceful exploration, the need to recover astronauts in distress will become more complex and far-reaching. Currently, US Space Command is charged with human space-flight support and actively supports launch and recovery operations of US-based crewed spaceflight. As humankind continues to travel further out from the most special place in the cosmos, the command will be ready to execute its responsibility for the human space-flight support mission.

Conclusion

Defining US Space Command's AOR has already had a profound impact on the way the United States, its Allies, and partners conduct operations and respond to

16. Space Foundation Editorial Team, "Global Space Economy Rose to \$447B in 2020, Continuing Five-Year Growth," Space Foundation (website), July 15, 2021, <https://www.spacefoundation.org/>.

17. *Satellite Pro Middle East*, "17,000 Satellites To Be Built and Launched by 2030: Euroconsult," *Satellite Pro Middle East* (website), December 7, 2021, <https://satelliteprome.com/>.

18. The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes, US, Australia, Canada, Italy, Japan, Luxembourg, UAE, UK, October 13, 2020, US National Aeronautics and Space Administration.

aggression and threats in space. In addition to the increased integration a space AOR will have on terrestrial operations, this development promises untold hinges of history that will be influenced by the understanding and execution of space operations. The four propositions posed here are just a glimpse of considerations necessary to adequately plan for the future of the space AOR.

Earth remains the most precious part of the universe. As humankind continues to expand into the cosmos, its actions must be focused on the preservation of this tenet. By thinking in a supraglobal fashion, decision makers will consider a more complete range of possibilities for identifying threats to military objectives and for appropriate astrographic as well as geographic solutions.

But before such solutions can be realized, leaders must understand how activities in the AOR differ from activities in the terrestrial domains. Reimagining AOR core principles such as key terrain will help spacefaring nations better analyze current capabilities and future needs and develop appropriate doctrine in response. This approach optimizes US Space Command's ability to protect and defend the capabilities originating from an AOR that holds worldwide relevance. When looking back in five to ten years from now, it will be even more apparent how our times contributed to defining a new "hinge of history," and how the establishment of the 100km and above AOR became our best response to that inflection point as we continue to sail our new wine-dark sea. Æ

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JOINT TASK FORCE QUARTZ THROUGH AN AIRPOWER LENS

DAGVIN R. M. ANDERSON

JASON T. HINDS

Joint Task Force Quartz gave Airmen an opportunity to develop, establish, lead, execute, and debrief a Joint task force during combat operations. The operational context required the development of a synchronized and integrated scheme of maneuver bringing together information operations, combat aircraft, combat support, and logistics for each night's air tasking order. As the Air Force develops new operational concepts, the command relationships must be built upon centralized command, distributed control, and decentralized execution all under the art of mission command.

On Friday the thirteenth, just before Thanksgiving in 2020, United States Africa Command (USAFRICOM) was notified to expect a decision to remove all US forces from Somalia. By the following Tuesday, we had direction from the president to reposition all US forces from Somalia no later than January 15, 2021. We received clarification over the next several days that we were to continue our tasked missions of training the Somalia defense forces, disrupting al Shabaab's external operations capability, and providing indications and warnings of terrorist activity and potential attacks.

To many this appeared to be simply a logistical exercise to reposition approximately 800 special operators and associated security and support forces. It was complicated, however, by the remote and austere locations from which our forces operated as well as by an enemy intent on killing American service members so they could declare victory as we repositioned. Adding a further challenge, all logistical operations would be conducted solely by air, at night, with little to no air-domain awareness.

Moreover, this became a large operation as senior defense leadership made it clear we would provide adequate support to protect our forces as more than 25 years later, the ghosts of Blackhawk Down still loomed over Somalia. To meet this compressed timeline while continuing our tasked mission, we determined the most feasible option was to reposition to bases in neighboring Djibouti and Kenya. To lead this effort, USAFRICOM established a command team that would be forward postured on the African continent with reach back to the command headquarters in Stuttgart, Germany.

Establishing a Joint Task Force—an Airmen's Perspective

Joint Task Force (JTF) Quartz was established under the command of an Air Force two-star commander from Special Operations Command, Africa to oversee the high-intensity, limited-duration repositioning of forces from Somalia. Since few forces are assigned to USAFRICOM and limited support exists in theater, a significant increase in forces was required to provide the overwatch and operational firepower necessary to deter al Shabaab attacks while US military elements were vulnerable.

These forces included over 230 Joint Force aircraft including the Fifteenth Amphibious Ready Group/Marine Expeditionary Unit, support from the USS NIMITZ Carrier Strike Group, theater C-130 airlift substantially augmented from bases in the United States, fighter and tanker support from United States Central Command-based aircraft, and special operations aircraft providing close air support, vertical lift, intelligence, surveillance, and reconnaissance, and helicopter air refueling.

These air assets, from multiple services across three combatant commands, converged in theater in a short amount of time and exceeded the theater's command and control capacity. In response, an air component was called upon to oversee complex air operations in an uncontrolled environment. The integration of an air component element triggered a conversation with USAFRICOM on the establishment of a Joint task force that would include a special operations component already established under Joint Special Operations Task Force Somalia, and the addition of a maritime component to command and control the US Marine Corps and US Navy afloat forces.

The air component was required to provide oversight to the air movement of all military personnel and equipment from Somalia as well as the deployment of additional capabilities such as the contingency response group (CRG) and security forces. US Forces were operating in austere locations; as a result, they were only accessible by tactical airlift, the largest being C-130s. This limitation drove the timeline and support requirements for the contingency response group to provide expeditionary cargo handling, close air support to provide both rotary and fixed-wing security for the loading operations, and overwatch to provide indications and warnings as well as targeting of al Shabaab fighters planning to attack US positions.

In light of this initial focus, the decision was made to support the JTF with a Joint air component coordination element (JACCE), led by an Air Force brigadier general, which would provide air expertise to the JTF while maintaining a direct link back to the theater Joint Force air component commander (JFAAC) and air operations center.

JACCE or AETF?

The JACCE was sufficient for the coordination of the airspace, control of the aircraft, and synchronization of operations. But the JACCE director also took the lead for a Joint Forces special operations command commander-developed Joint asset allocation meeting (JAAM) where all assets—air, maritime, SOF, and information operations—were integrated daily. With this scope of responsibility, the JACCE director acted as a de facto air expeditionary task force (AETF) commander with the delegated authority

from the JTF commander to direct the JAAM process and integrate all assets across multiple domains. The transition of the Joint asset allocation meeting process to the JACCE director allowed the commander of the Joint Force special operations command, as the supported commander, to focus on the repositioning of security forces.

With this responsibility to synchronize the delivery of airpower in concert with the ground scheme of maneuver and targeted kinetic strikes using TF-111 assets, the establishment of an AETF subordinate to the JTF would have been a better construct given the array of air assets from across the Joint Force requiring integration. In the end, an air expeditionary task force has inherent command authorities, while the JACCE is intended to be a coordinating element on behalf of the JFACC.

The JACCE director also had the ability to reach back to the theater JFACC for unique approvals as some authorities were withheld at the higher echelon. For the execution of Operation Octave Quartz, this proved sufficient. But had al Shabaab been able to mount an effective offensive effort that would have required a more aggressive kinetic response, this additional layer of command would have created delays and proven insufficient.

In addition to the complex air picture that rapidly developed in theater, the entire airspace over Somalia was uncontrolled and all our operations were conducted under the cover of darkness. The compressed timeline along with the rapidly growing force required the air component to quickly develop an airspace deconfliction plan robust enough to handle as many as 90 sorties per night, simple enough to allow aircrews to quickly integrate into operations, flexible enough to enable decentralized execution, and safe enough to ensure proper deconfliction.

This task was complicated by the fact that this diverse spectrum of airpower was then concentrated in a very confined area over the locations where US Forces were operating without any persistent tactical datalink capability or air domain awareness systems. The establishment and management of the procedural control measures became the initial task of the JACCE including ensuring all air units fully understood the rules of engagement and authorities for a theater that few had ever flown in.

The JACCE team did a fantastic job establishing these procedures and, more importantly, proactively disseminating information and conducting training sessions as new units arrived. As noted by the commander of the air group from the USS Nimitz Carrier Strike Group, “This is what right looks like—this was excellent experience and training for my aircrews who aren’t used to flying in this type of uncontrolled airspace.”¹

When considering future operations in a contested environment where communications and data transfer are disrupted, establishing the right level of command and control forward with delegated authority will be critical to maintain an agile and capable response. In hindsight, the JTF commander would have advocated for the establishment of an AETF with delegated authorities and the ability to request additional authorities as the operation evolved. Having an AETF with a designated commander ensures the air component has an equal voice in decision making and

1. Email to authors from Navy Captain Todd F. Cimicata, Commander, CVW-17, January 19, 2021.

brings the full spectrum of capabilities to bear for the Joint task force commander. In the end, the JACCE construct worked for JTF Quartz but an AETF would have better supported mission command.

Success of the JAAM

The next priority became integrating these forces into the air tasking order as they converged on the theater. This effort entailed creating, distributing, and reviewing the special instructions (SPINS), mission rehearsals, nightly 9-line check-ins with the Joint terminal attack controllers, synchronized live fire events to allow integration as well as deterrence, and contingency planning. This is where the Joint asset allocation meeting process benefited from the newly formed team responsible for integrating actions across multiple domains.

Guided by the JTF commander's intent, the JAAM developed operational approaches that placed doubt in the adversary's mind regarding its ability to strike US Forces. If al Shabaab wasn't deterred, the operational approach ensured we would be prepared to identify al Shabaab forces before they could mount an attack or disrupt an emerging attack with kinetic fires.

Additionally, the JAAM brought information operations to the front of mission planning. For specific missions, we began our mission planning efforts with an objective of what the JTF commander wanted al Shabaab to believe would be true. The JAAM allowed the air, maritime, and special operations components to develop, propose, discuss, and integrate activities that would support the desired operational message targeted at al Shabaab. The results were often innovative solutions to information operations which worked extremely well and measurably reduced the risk to US forces.

The JTF Quartz team rapidly established the command structure, developed processes, and gained alignment from the assigned forces. Over the course of just 37 days, the team repositioned over 1600 US personnel, 4.8 million pounds of equipment equivalent to 1,011 pallet positions, 193 C-130 missions, 247 periods of close air support coverage, and 1,160 sorties from the other supporting aircraft. The team completed the mission with a few days to spare, no aircraft incidents, and no successful al Shabaab attacks.

The keys to success included clear and well-defined direction, commitment by all to the ordered timeline, and a rapid alignment of the forces supporting the Joint task force. One can see the elements of centralized command, distributed control, and decentralized execution in the manner the JTF commander and JFACC organized and delegated decision making. Their approach was critical to the success of JTF Quartz mission command.

Mission Command, A JFACC's Perspective

General Jeff Harrigian, Commander, USAFE-AFAFRICA

As the JFACC for JTF-Quartz, we recognized the need to send the right team to support the Joint Force on behalf of the air component and we needed to move out. Our team was going to have a significant level of responsibility and authority, meaning they had to know the theater, know the mission, and know how I think. Mission command is more than delegation of responsibilities to the appropriate level, it is understanding the JFACC's intent from the four-star level all the way down to the lowest tactical element in the command relationship. It is over communicating between the AETF commander or JACCE director and the JFACC as the situation adjusts. It is the AETF commander or JACCE director routinely speaking with unit commanders especially as they rotate into the theater so they understand their task, purpose, special instructions, rules of engagement, and the JFACC's intent. Gone are the days when an aircraft commander had to ask for permission to take action. Our future way of warfare requires more flexibility in tactical operations, and more responsibility will be expected of our youngest leaders. It is not lost on me that tactical-level decisions could very well have strategic implications in a large-scale conflict. That is not something we should shy away from; we need to acknowledge it and use it to educate our Airmen. Airpower is inherently flexible and command relationships must ensure that agility will be there during the high-end fight. Mission command is not only how we lead our Airmen, it is how we let our Airmen lead.

Lessons from Somalia

The airspace over Somalia and other locations in Africa exemplified certain characteristics of a contested environment and their impact on air domain awareness. The Joint Force expects air domain awareness and tactical command and control from the air component. A lack of air domain awareness typically arises from adversary denial activities or a lack of capability. Joint Task Force Quartz lacked the capability to provide the typical air domain awareness and tactical command and control, which placed those executing the mission in degraded operations from the beginning of mission planning.

The Joint Force is very familiar and comfortable with tactical control while procedural control is viewed more as a contingency and is, therefore, rarely discussed in mission planning. The contested nature of today's operating environments provides ample reasons for the Joint Force to explore procedural control in a denied environment and include procedural control in operational planning. Once procedures are in place, a thorough understanding of mission command, commander's intent, and delegated authorities are needed from the Joint Force commander's level down to the unit level.

Integrating logistics into the greater scheme of maneuver during a conflict phase proved difficult due to the Joint Force processes mobility planners must follow. The processes are very good when efficiency is needed to optimize the use of logistics

forces in peacetime, permissive environments, and often standalone operations. Setting the theater in a road to war, such as a time-phased force deployment data flow, is and should be efficiency based, which allows mobility planners to develop a plan that others will support if needed.

Joint Task Force Quartz was operating on a fixed end date with a thinking adversary, which required an effectiveness-based logistics model. Due to the constraints of operating solely under the cover of darkness with the protective cover of manned, fixed-wing close air support and intelligence, surveillance, and reconnaissance platforms, the C-130s were required to operate during specific times at each contingency support location. The traditional efficiency-based logistics process did not provide the flexibility needed by the logistics planners to properly integrate mobility into the greater scheme of maneuver.

This challenge isn't unique to JTF Quartz as we've seen similar lessons learned across the US Air Force during Operation Allies Refuge and major command Agile Combat Employment operations. During contested operations, logistics planning systems need to communicate seamlessly with air tasking orders production to synchronize and integrate logistics forces with combat operations. To achieve the needed level of integration, logistics needs to be part of the planning from the start and not bolted onto a plan already developed. To truly enable mission command, logistics operations planning in support of contested environments needs to be delegated down and not centralized.

Conclusion

Joint Task Force Quartz provided the unique opportunity for Airmen to develop, establish, lead, execute, and debrief a Joint task force during combat operations. Airmen need to understand how the air component can best support a JTF and should be prepared to discuss the benefits and constraints of an AETF or JACCE. The operational context provided the Airmen of JTF Quartz the task of developing a synchronized and integrated scheme of maneuver bringing together information operations, combat aircraft, combat support, and logistics for each night's air tasking order.

The creativity of the Airmen supporting the greater JTF enabled the mission to be completed on time, safely, and effectively. As the Air Force continues to develop new operational concepts, the command relationships must be built upon centralized command, distributed control, and decentralized execution all under the art of mission command. Æ

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A NEW BATTLE COMMAND ARCHITECTURE FOR JOINT ALL-DOMAIN OPERATIONS

DAVID A. DEPTULA

To achieve the objectives of JADC2, the US Air Force must deliver information to warfighters at the edge of the battlespace. The service must rapidly evolve beyond the large, centralized combined air and space operations centers of today—hundreds of people in stovepiped divisions around segregated mission areas—to a much more agile and dispersible set of processes and command-and-control structures. This new architecture must adapt to the air battle management system and JADC2 developments. But given the slow evolution of these programs, the Air Force cannot wait to begin changing the architecture for command and control of aerospace forces.

In mid-2021, the Chairman of the Joint Chiefs of Staff (CJCS) General Mark A. Milley testified to Congress about the US military's new joint warfighting concept (JWC) and the importance of the associated Joint All Domain Command and Control (JADC2) framework to its realization.

The JWC is a multi-year effort to develop a comprehensive approach for joint operations against future threats and provide a guide for future force design and development. Supporting concepts to the JWC describe key warfighting functions. They are fires, logistics, C2, and information advantage. The Joint All Domain Command and Control (JADC2) framework enables the holistic development and realization of the JWC and Supporting Concepts.¹

The fundamental basis of the joint warfighting concept is the notion of all-domain operations. This concept is the next evolution in the US military's journey to optimize the synergy of effects that accrues from operating in an integrated fashion across the domains of air, space, sea, land, and the electromagnetic spectrum. The journey began with the passage of the Goldwater-Nichols Department of Defense Reorganization Act of 1986 that aimed to improve the ability of the armed forces to conduct joint (inter-service) and combined (interallied) operations.

If developed and implemented properly, the joint warfighting concept will yield a far more decisive, powerful set of combat outcomes than today's joint operations that, in many cases, simply involve service component deconfliction versus integration. For the joint warfighting concept to happen, the Department of Defense (DOD) needs to

1. *The Fiscal Year 2022 National Defense Authorization Budget Request from the Department of Defense, Before the US House of Representatives Committee on Armed Services*, 117th Cong. (2021) (Statement of General Mark A. Milley, Chairman of the Joint Chiefs of Staff).

get serious about turning theory into reality. That means taking incremental but concrete steps toward meeting the objectives of JADC2, not waiting for a complete solution to implement this concept.

Joint All Domain Command and Control will require much time to engineer as it involves a mammoth conversion of existing concepts, capabilities, and service perspectives. But these endeavors can be accelerated through the rapid evolution of current command and control (C2) paradigms. Specifically, it is time to move beyond large, centralized, static command and control facilities to mobile, distributed command and control, with the capability to handle the same volume and diversity of information as a regional combined air and space operations center.

As it seeks all-domain synergy by embracing complementary versus merely additive employment of capabilities from different domains, the goal of JADC2 is to attain interdependency that enhances effectiveness and compensates for individual vulnerabilities of each of the domains. Desired military effects will increasingly be generated by the interaction of systems that share information and empower one another.

Instead of a set of disconnected, singularly focused combat systems in each of the domains, the JADC2 vision sees assets combined through digital connective glue to become a weapon system capable of conducting disaggregated, distributed operations over an entire operational area. This effort will require treating every platform as a sensor and an effector. It will require a new battle command architecture and C2 paradigm that enables automatic linking, as does cellular phone technology today. This architecture will also need to transfer data securely, reliably, and seamlessly without the need for human interaction.

The Envisioned Transformation

The overarching goal of actualizing JADC2 with the degree of integration required to achieve a self-forming, self-healing complex into reality will be difficult and require significant effort. Every military service and combatant command will be involved. Several major obstacles in organization, culture, training, acquisition, and policy will need to be overcome. This effort will require connecting, decision making, and responding at speed. It will require resilient networks and a degree of sharing among service components, Allies, and partners not yet achieved.

These numerous and multifaceted challenges are being addressed across services, combatant commands, and our Allies and partners even now. But due to their complexity, it will take many years—if not decades—before the ultimate vision of integrated, interdependent, self-forming, self-healing all-domain joint and combined operations are a reality. Yet the growing threats facing us demand solutions today. Accordingly, it is time to address the elements of JADC2 that can be changed now to meet these challenges.

Each of the service components and combatant commands have well-established operating command and control concepts, facilities, and procedures that have proven workable in past conflicts. Each of the variety of command and control architectures

that currently exist, however, will require extensive modification in order to survive—much less operate—against emerging threats.

A prerequisite to successful operations in all the domains is control of the aerospace environment. Once established, this control facilitates the freedom of action and movement for all other joint and combined forces—without it, effective joint and combined operations are not possible. Accordingly, the critical functions that ensure effective command and control of aerospace operations must be a priority.

The ability to command and control air and space forces is affected by three major elements: threats, technology, and the velocity of information. The changes in these three areas since the design, establishment, and operation of the US Air Force's air and space operations center—the AN/USQ-163 Falconer—have been dramatic and continue to accelerate.

Therefore, it is time to ask the question, can the Air Force achieve success in future operations by evolving our current concepts of operation, organizations, and acquisition processes for modernization or must the service seek fundamental change to each of these elements that affect the current theater air and space control system? Before providing an answer, let's take a brief look at each of the trends affecting our ability to effectively command and control aerospace operations.

Future Threats and the Operational Environment

Threats

Today, peer threats pose unacceptable risk to current means of command and control when the US military is attempting to operate inside an anti-access/area-denial (A2/AD) environment. For over 30 years, the US Air Force has essentially been on a command and control holiday having the luxury of not being contested in the aerospace domains. Those days are over.

Military competitors have accomplished modernization on an unprecedented scale. They have rapidly closed the gap with the US, Allies, and friendly militaries across a broad spectrum of capabilities including aircraft, spacecraft, missiles, weapons, cyber, command and control, jammers, electronic warfare, data links, and others.

Potential adversaries have also studied the American way of war and have determined it is better to keep us out of their neighborhood rather than face our combat power. They have adopted and are proliferating A2/AD capabilities designed to deny the US and its Allies and partners freedom of action. Mitigating these capabilities pose significant challenges driving us to operate with greater risk and farther away from potential areas of conflict.

Anti-access/area-denial capabilities threaten the service's ability to command and control air and space operations in multiple ways. Near-peer adversaries can employ kinetic and nonkinetic weapons to deny us communications and intelligence, surveillance, and reconnaissance from space-based assets thereby isolating our forces and blinding our view.

Cyber attacks are becoming more sophisticated and can disrupt operations at well-established combined air and space operations centers. Accurate long-range cruise and ballistic missiles now threaten these large, fixed, and vulnerable facilities. As the factory for generating strategy, plans, and the tasking orders for air and space assets, the combined air and space operations center has become an extremely lucrative target.

Technology

New technologies are enabling new capabilities that optimize command and control mechanisms to accomplish desired effects. The service needs to think beyond constraints that traditional culture imposes on new technology. For example, next-generation aircraft may still be labeled in traditional nomenclature such as fighters, bombers, and airlifters, but technologically they have the capability to perform multiple missions due to the miniaturization of sensors, processing power, weapons, energy production, and other capabilities. They are flying “sensor-effectors” that can form the basis of highly resilient redundant-node networks and multiple kill paths to minimize the critical system value of current highly centralized and limited command and control nodes—like combined air and space operations centers—that an enemy could easily target.

This will require leading-edge networking capabilities, assured communications, and different approaches to solving our data bandwidth challenges. For example, to solve the explosion in data growth from advanced sensors, instead of building bigger pipes to transmit the collected data, increases in processing power now enable the processing of data on-board and the off boarding of only what is of interest to the users. This approach inverts the way we do intelligence, surveillance, and reconnaissance processing today.

Rapid information exchange is especially important at the forward edge of combat, for the value of actual data is often transitory and diminishes as time and circumstances pass. The development of a technological approach to share information automatically and rapidly among diverse users and across multiple classifications and Allied and partner nations will be a key to creating the future force.

The old adage, “speed is life” is no longer just about flying—it is also about rapidly evolving software tools to fight and win. We must think outside of the organizational constructs that history has etched into our collective psyche. Network-centric, interdependent, and functionally integrated operations are the keys to future military success.

Velocity of Information

Significant advancements in telecommunications, sensors, data storage, and processing power are emerging every day. As a result, the targeting cycle has evolved from weeks to days to minutes, and from multiple, specialized, and separate aircraft to the ability of one aircraft to “find, fix, and finish” in minutes. Growing accessibility to information requires the restructure of command and control hierarchies to facilitate

rapid engagement of perishable targets and to capitalize on our technological capability. Information synthesis and execution authority must be shifted to the lowest possible levels while senior commanders and staffs must discipline themselves to stay at the appropriate level of war.

To move beyond large, centralized, static command and control facilities to mobile, distributed C2, with the capability to handle the same volume and diversity of information of a regional combined air and space operations center today will require a reappraisal of how the service deals with information flow. The two most important aspects of this future capability will be the “command” metamorphosis it will enable through the synchronizing “control” it will provide.

The “art of command” will morph to realize Metcalfe law network values (Metcalfe’s law states that the value of a telecommunications network is proportional to the square of the number of connected users of the system).² And the science of control will continue to apply Moore’s law expanding technology to extend human capacity.³ Gaining and maintaining a decision-cycle advantage for both will provide the path for optimal growth.

A New Architecture for Aerospace C2

We are now at a juncture where threats, technology, and the velocity of information require a change in the established architectures that command and control aerospace forces. All the military services have recognized this and have initiated actions to develop new concepts of operation for their respective domains. The challenge will be how to ensure each of the individual service concepts of operation are integrated into a unified Joint all-domain command and control architecture.

Developed with the idea of creating an intelligence, surveillance, and reconnaissance, strike, maneuver, and sustainment complex that uses information-age technologies to conduct highly interconnected, distributed operations, this combat cloud will usher in an entirely different architecture for the conduct of war. The fundamental basis of JADC2 is to push accurate, quality information down to the lowest information node to achieve a desired effect, regardless of service, domain, or platform.

The US Air Force approach to this goal is its efforts to design and develop an advanced battle management system (ABMS). The elements of the ABMS have been defined, but they have yet to be developed into an executable command and control architecture. To get to the desired end state of the ubiquitous and seamless sharing of information across the battlespace in a secure, reliable, and robust fashion for both JADC2 and ABMS will take many years. Given the rapid evolution of significant threats and the vulnerability of current C2 facilities, the service must modify the current command and control construct for aerospace forces now.

2. Techopedia, “Metcalfe’s Law,” Techopedia, May 28, 2019, <https://www.techopedia.com/>.

3. Mike Gianfagna, “What is Moore’s Law?,” Synopsys, Inc., June 30, 2021, <https://www.synopsys.com/>.

A new architecture is needed to support an operating concept that actualizes the C2 paradigm that has recently been ensconced in US Air Force doctrine of centralized command, distributed control, and decentralized execution. No breakthroughs in technology are required to institute a new battle command architecture as the technology already exists to deal with the immediate challenge of distributing command and control functions so that they cannot be eliminated with a few strikes on a few critical C2 nodes.

The US Air Force has been developing a supporting concept of operations to their new doctrine known as agile combat employment (ACE). Agile combat employment is a concept that disperses forces and assets to multiple separated locations on short notice to complicate adversary planning. With an appropriate C2 system, ACE can hold adversary targets at risk from many locations that are defensible, sustainable, and relocatable. The details for application of the concept are unique depending on the theater of use, but fundamentally the idea is the same, and command and control is fundamental to the concept's success.

The combined air and space operations center will remain a viable means to conduct C2 operations during periods of less than major regional conflict. To achieve the objectives of JADC2, however, the service will have to deliver information to warfighters at the edge of the battlespace without relying on the traditional combined air and space operations center model of hundreds of people organized in stovepiped divisions around segregated mission areas.

Accordingly, the service must rapidly evolve beyond the large, centralized combined air and space operations center structures we rely on today to a much more agile and dispersible set of processes and command and control structures. At the same time, this new architecture must be adaptable to the air battle management system and JADC2 developments. But given the slow evolution of these programs, we cannot wait to begin changing the architecture for C2 of aerospace forces.

Many options exist for this new architecture: build hardened combined air and space operations centers and remote the functions to assigned units; distribute planning functions currently incorporated in combined air and space operations centers to multiple locations and share the resulting plans among them; and create processes and procedures to be executed based on the degree of degradation of connectivity between combat units and their respective command elements by shifting execution authority corresponding to levels of connectivity.

Regardless of what is selected for development, one thing is certain, the US Air Force must undertake a determined effort to distribute the command and control functions necessary to assure the effective use of aerospace forces in a contested environment, and that effort must begin now. *Æ*

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ACCELERATE CHANGE AND STILL LOSE? LIMITS OF ADAPTATION AND INNOVATION

HEATHER P. VENABLE

Achieving air dominance requires more than technology. History reveals that technological solutions do not always offer the surest path to success. In this vein, calls for change provide terse nods to concepts and ideas, such as potential competitors' "theories of victory," while privileging more technological solutions. The services need a sound strategy to answer the requisite preliminary question of innovation or adaptation: we can, but should we? And, if we pursue innovation or adaptation in one area, what other area must be neglected because of that choice?

Great changes in the character of war are normally brought about by other forces than the power of weapons. . . . For the tendency is that sooner or later an antidote is found for each new form of attack.

Sir Frederick Barton Maurice in Jeremy Black, *War and Technology*

It is a truth now almost universally acknowledged that an air force in possession of a good fortune must be in want of a next-generation fighter jet, or so it has seemed to be the case for the US Air Force, particularly since the so-called fighter generals came to dominate the institution after the Vietnam War.¹ Perhaps at no time since the Arab-Israeli War of 1973 have the stakes to innovate or adapt a wide range of necessary capabilities been higher.

Indeed, the need to replace so much legacy equipment helps explain much of the Chief of Staff of the Air Force General CQ Brown's call to "accelerate change or lose." Whether or not his battle cry will result in meaningful results remains to be seen—the ability to innovate or adapt alone does not serve as a mandate for such activity, especially if one does not have a sound strategy in place. As Jeremy Black argues, technology can reshape war without necessarily making it "more effective," as occurred prior to and during World War I.²

All US military institutions must also subject their cultural predilection for innovation and adaptation to a cost-benefit analysis. The services have suffered from an excess

1. I am grateful to Lt. Col. Donald Seablom for his suggestions here and elsewhere as well as Dr. Ryan Wadle. All errors are my own.

2. Jeremy Black, *War and Technology* (Bloomington: Indiana University Press, 2013), 32.

of plenty in many ways that has dulled sharp decision making in the quest for effectiveness at the cost of efficiency. Historian Russell Weigley summed up the American way of war as a tendency to use overwhelming force. If Weigley's assessment was once true, this preference has perhaps now been replaced by the tendency of the US military to focus on whether it *can* do something rather than first determine if it *should*.

Defining Adaptation and Innovation

As the US military shifts from 20 years of significant planning and operations focus on counterterrorism and countering violent extremism, the United States is belatedly recognizing that China and other nations have begun dramatically undermining the US military's technological superiority. As a result, the national security community has, somewhat haphazardly, repeatedly thrown around words like innovation and adaptation.³

Innovation can be understood as the creation of a new product or entity. Frank Hoffman, for example, defines innovation as "new organizational competencies, doctrine, and tasks." By contrast, adaptation consists of incremental or evolutionary improvements. Hoffman describes this process as "learned changes to existing competencies and capability."⁴ Updating an aircraft's navigation system may be considered an adaptation, but a product like the Navy's refueling drone, the MQ-25 Stingray, would be considered innovative. Of course even this drone is not entirely new, as it is an adaptation of many inventions, including aerial refuelers. The point is to highlight how innovation and adaptation occur along a spectrum (fig. 1).⁵

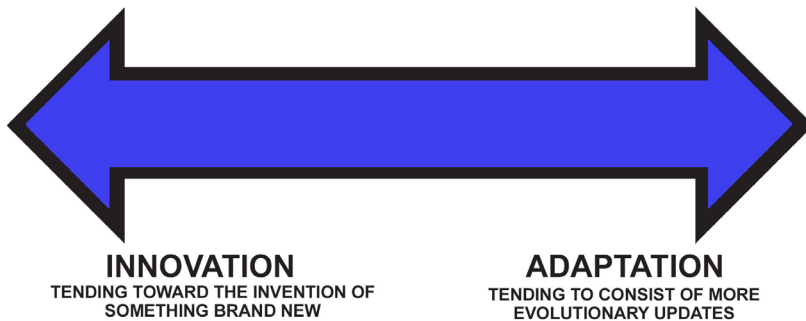


Figure 1. Spectrum of innovation and adaptation

The military is not alone in embracing innovation as an effort with inherent advantages unhindered by drawbacks. This perspective builds on ongoing progressive

3. Michael O'Bryan, "Innovation: The Most Important and Overused Word in America," *Wired*, 2013, <https://www.wired.com/>.

4. Frank Hoffman, *Mars Adapting: Military Change During War* (Annapolis, MD: Naval Institute Press, 2021), 7.

5. Hoffman, *Mars Adapting*, 6.

strains in US culture writ large beginning early in the twentieth century. Progressivism stressed how technology and other reforms could improve societal efficiency, a notion the US military wanted to act on anyway in seeking to avoid any replication of World War I trench warfare.⁶ The Army Air Forces took this movement one step further, seeking to wage warfare faster, more cheaply, and more humanely by carefully selecting strategic targets rather than focusing on defeating fielded forces.

Ironically, though, in World War II, the Army Air Forces largely threw out any possibility of efficiency in the European theater as it sought to validate its strategic bombardment theory. Efficiency can be defined as “economy in the application of force, comparing cost to outcome” in pursuit of effectiveness.⁷ General Henry H. “Hap” Arnold has received attention for how well he enabled innovation and adaptation, bringing together industry, airmen, and academics. But the extent to which his ability to lead an organization through combat successfully is more arguable, especially considering how he pushed for numbers of sorties to be flown, even in less than optimal weather conditions.

Arnold’s aggressive approach made strategic airpower very imprecise, the very opposite of what the Army Air Forces had spent much of the interwar period seeking to implement. In 1943, Arnold began pushing his friend, Eighth Air Force Commander General Ira C. Eaker to pursue numbers of sorties over either efficiency or effectiveness. Richard Overy estimates that 75 percent of the Army Air Forces’ effort in the Allied Combined Bomber Offensive can be considered “blind bombing,” or radar guided.⁸ Unfortunately, radar bombing struggled to provide much-needed precision at a time when it was not uncommon to drop bombs five miles off target.⁹ By contrast, only 25 percent of the Allied effort involved the daylight precision bombing that the institution preached prior to the war, the kind of precision necessary to attack key targets like oil refineries.

The wasted effort to be seen “doing something” is staggering. That is not to say the Combined Bomber Offensive did not produce important strategic outcomes for the Allies in terms of achieving air superiority and impeding the Germans’ ability to maneuver. Rather, the point is that the Combined Bomber Offensive could have achieved a similar outcome at far less human and economic cost.

Adaptation and Innovation in the US Military

More than 75 years later, the US military seeks to accelerate processes for understandable reasons, leading military leaders to look to civilian corporations for

6. Mark Clodfelter, *Beneficial Bombing: The Progressive Foundations of American Air Power, 1917–1945* (Lincoln: University of Nebraska Press, 2010).

7. Donald J. Mrozek, *Air Power and the Ground War in Vietnam: Ideas and Actions* (Maxwell AFB, AL: Air University Press, 1988), 99.

8. Richard Overy, *The Bombers and the Bombed: Allied Air War over Europe, 1940–1945* (New York: Penguin, 2013), 158, 204.

9. Overy, *Bombers and the Bombed*, 158.

inspiration. This trend is perhaps best epitomized by the unofficial adoption of Facebook's notion of moving faster and breaking things.¹⁰ But as Lee Vinsel argues, this mantra can be disastrous for those who have to design "actual" products that function as envisioned.¹¹ The Samsung Galaxy 7 phone, for example, received high praise for its innovative nature before being recalled for serious problems with batteries bursting into flames, reflecting a "fundamental problem" with the phone itself, as the need to entice consumers with a new product led engineers to push safe boundaries.¹²

Successful innovation also requires far more than savvy ideas or someone with the technical capacity for implementing those ideas. As Hoffman stresses, an institution must have the necessary organizational learning capacity for successful adaptation. "An organization must support a deep understanding of history coupled with a decentralized leadership philosophy; a culture that promotes a flexible, realistic and non-dogmatic operational doctrine, the organizational capacity to explore ideas . . . and both formal and informal information-sharing practices."¹³ Successful innovation and adaptation thus require top-down and bottom-up leadership as well as ways to disseminate successful adaptations. Well-trod paths must be woven into institutional memory and habits.

Unfortunately, recent Air Force efforts to accelerate change have not entirely met Hoffman's vision for long-term success despite their splashiness. In the past few years, for example, the Air Force has created more than 50 innovation hubs, provided squadrons with more than \$64 million to pursue innovation, and even established the Spark Tank competition.

But as Evan Hanson and James Eimers point out, the Air Force failed to create the organizational means to follow through with promising ideas selected through competitions like Spark Tank. Senior leaders did not provide continued guidance and encouragement, and Airmen selected to pursue ideas felt isolated and stressed by the need to develop their ideas in addition to continuing their normal daily Air Force responsibilities.¹⁴ This tendency accords with the Air Force's past trajectory, having often grounded the battle cry for change in an excessive emphasis on technological solutions. As Carl Builder notes, the Air Force worships at the "altar of technology."¹⁵

Recent articles, while making brief nods to culture, ideas, and other factors, largely continue to exhibit this predilection. One recent *Air & Space Power Journal* article im-

10. Hemant Taneja, "The Era of 'Move Fast and Break Things' Is Over," *Harvard Business Review*, January 22, 2019, <https://hbr.org/>.

11. Lee Vinsel and Andrew L. Russell, *The Innovation Delusion: How Our Obsession with the New Has Disrupted the Work that Matters Most* (New York: Currency, 2020), 8–9.

12. Anna-Katrina Shedletsy, "Samsung Galaxy Note 7 Teardown: How Aggressive Design Caused Battery Explosions," *Instrumental*, n.d., accessed January 3, 2022, <https://instrumental.com/>.

13. Hoffman, *Mars Adapting*, 272.

14. Evan Hanson and James Eimers, "The Air Force America Needs: Innovation, Spark Tank, and Ideas to Sustain Air Dominance," *Strategy Bridge*, November 16, 2020, <https://thestrategybridge.org/>.

15. Carl H Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: Johns Hopkins Press, 1993), 21.

portantly acknowledges Builder's point that after the Vietnam War "airpower theory lost its central role in driving the future direction of the USAF to be replaced by a focus on incremental improvements in the tactical and operational art of flying jet aircraft."

The authors also note that culture enables technological change. But at the same time, the authors want this culture to support not adaptation—those "incremental improvements" they decry—but innovation, insisting that "sustaining war-fighting advantages in the twenty-first century will require a dramatic increase in technological innovation at all levels," thereby enabling "the next generation of technology, often while the current generation [is] just reaching the field."¹⁶ This future-leaning argument, however, offers no reason why a "dramatic increase" in innovation is required in comparison to airpower's past trajectory. It also offers little insight into why the Air Force should lean into innovation over adaptation, concluding that "technology is the key to combat advantage," a technologically deterministic proposition.¹⁷

Even airpower scholar and retired general I. B. Holley Jr. fell victim to this tendency. He offered early in one work that "Napoleon had no weapons better than his adversaries. He merely took advantage of their possibilities."¹⁸ Yet Holley contradicted himself elsewhere, concluding, "to exist in a warring world the nation must pick winning weapons." This statement leads to a bit of a conundrum considering the rhetoric that embraces typical, albeit problematic assumptions about a next war being necessarily fast. As such, the weapon often must be selected, developed, and fielded before conflict breaks out. Like Cooley and Dougherty, moreover, Holley's emphasis on weapons being "winning" smacks of technological determinism; what constitutes a war-winning technological distinction is an entirely different debate.

Recently, Air Force leaders have pushed beyond aircraft to contextualize airpower's foundation as rooted in something deeper than platforms. (Historically, arguments for innovation and adaptation in the Air Force have tended to be platform-centric. Builder probably goes too far in saying somewhat condescendingly that the Air Force of all the services is the "most attached" to "toys."¹⁹) Yet while leaders may have jettisoned the myopic focus on a fighter aircraft, they have perhaps just substituted a broader range of capabilities for a single platform.²⁰ This may be an improvement in some regards, but the focus still privileges material over intellectual solutions.

Of course some in the Air Force recognize this. Then-Brigadier General Alex Grynekwich posited in 2017 that the air superiority solutions of 2030 would "require a

16. William T. Cooley and George M. Dougherty, "Every Airman and Guardian a Technologist: Rein-vigorating a Disruptive Technology Culture," *Air & Space Power Journal* 35, no. 2 (Summer 2021): 77, <https://www.airuniversity.af.edu/>.

17. Cooley and Dougherty, "Disruptive Technology Culture," 89.

18. I. B. Holley, *Technology and Military Doctrine: Essays on a Challenging Relationship* (Maxwell AFB, AL: Air University Press, 2004), 5.

19. Builder, *Masks of War*, 23.

20. Sydney J. Freedberg Jr., "A Computer That Happens to Fly": USAF, RAF Chiefs on Multi-Domain Future," *Breaking Defense*, April 16, 2018, <https://breakingdefense.com/>.

rejection of platform-based thinking that yearns for a ‘silver bullet’ solution.”²¹ In this vein, he proposed a sixth-generation air superiority aircraft not even be called a fighter in case that classification might limit imagination.²²

Achieving air dominance, however, requires more than technology. Historians have continually sought to remind the Air Force that technological solutions do not always offer the surest path to success. In this vein, Brown’s call for change provides terse nods to concepts and ideas, such as potential competitors’ “theories of victory,” while privileging more technological solutions.²³

Case Studies in Adaptation and Innovation

Four examples from three different services highlight the continuity between earlier strains of adaptation and innovation and today: the use of helicopters in the Vietnam War, the tactical focus of the Marine Corps’ expeditionary advanced basing operations, Army fitness, and how the Air Force seeks to implement the JADC2 concept. These case studies highlight how innovation and adaptation should be considered within the broader context of the Department of Defense’s problematic strategies.²⁴

Until civilian leadership and Congress force the US military to face tough choices, it will continue to pursue a tactical smorgasbord of adaptation and innovation rather than a holistic plan unified in pursuit of an overarching strategy. In an environment characterized by changing political parties and various terminologies for future conflict, the Department of Defense must chart a desired end state and embrace a measured path toward achieving necessary capabilities. Adaptation and innovation also must be reconsidered within a culture of inefficiency that continues to exist even amid the threat of tightening budgets.

US Army Helicopters in the Vietnam War

Militaries must align adaptation and innovation with a sound strategy that befits a war’s unique character and context. The immense challenge this poses can be seen in the innovative, creative ways the US Army integrated helicopters into the Vietnam War for tactical and operational success but not for strategic success. Indeed, new technology in the form of the helicopter married to old ideas such as the need to move troops around faster, largely enabled a problematic search-and-destroy strategy given the Vietnam War required far more political than military solutions.²⁵ As early as

21. Alex Grynkeiwich, “The Future of Air Superiority, Part IV: Autonomy, Survivability, and Getting to 2030,” *War on the Rocks*, January 18, 2017, <https://warontherocks.com/>.

22. “Defining the Next Air Superiority Platform,” *Air Force Magazine*, July 10, 2017, <https://www.airforcemag.com/>.

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

24. Paul Scharre and Ainikki Riikonen, “The Defense Department Needs a Real Technology Strategy,” *Defense One*, April 21, 2020, <https://www.defenseone.com/>.

25. Mrozek, *Ideas and Actions*, 73.

1970, for example, counterinsurgency expert Sir Robert Thompson argued the helicopter may have been one of the “major contributions to the failure of strategy” in the war.²⁶

Despite the enormous tactical benefits provided by the helicopter—ranging from evacuating injured infantrymen quickly to enabling the more efficient mobility by air—innovation proved to be counterproductive at a strategic level.²⁷ If lack of local support explained the inability to arrive via ground transport, then the use of helicopters only bypassed the need to gain the backing of the local population. The innovation represented by the helicopter allowed the US military to avoid the painstaking work of securing local support.

Helicopters enabled commanders to pursue the questionable notion that “the name of the game . . . was contact.”²⁸ Many commanders favored kinetic contact to draw on the enormous amount of firepower the United States had at its disposal—the United States dropped double the bomb tonnage on Vietnam, Laos, and Cambodia that it had during World War II.²⁹ But the North Vietnamese Army, an elusive, thinking opponent, generally refused to fight on unfavorable terms. Again, a more nonkinetic approach designed to provide security and meet the significant grievances of local populations might have been more productive.

As Donald Mrozek argues, “innovation, flexibility, and versatility are part of the vocabulary of virtue in the United States.” But these often positive traits can be problematic. At times in Vietnam, “innovation may have brought more harm than good, more risk than opportunity. . . . The difficulty lay largely in calling correctly where innovation turned into excess.”³⁰

The Marine Corps and Tactical Adaptation

Despite challenging budgets, the United States should not fool itself that it is particularly parsimonious. The US military still has the luxury of adapting and innovating with what other nations might consider expensive gimmicks. A 2021 social media post, for example, hailed a CH-53 heavy-lift helicopter carrying a naval strike missile to test the Marine Corps’ concept of expeditionary advanced base operations (fig. 2).³¹ The question must be asked: How does such a tactical adaptation support strong operational or, even more importantly, strategic concepts?

26. Mrozek, *Ideas and Actions*, 73.

27. Mrozek, *Ideas and Actions*, 76.

28. Mrozek, *Ideas and Actions*, 77.

29. Cooper Thomas, “Bombing Missions of the Vietnam War,” Esri ArcGIS Storymaps, n.d., accessed January 3, 2022, <https://storymaps.arcgis.com/>.

30. Mrozek, *Ideas and Actions*, 123.

31. Twitter, Jordan Fox @J_FoxthePog, September 2, 2021.



Figure 2. Twitter post from Jordan Fox

Just as it is worth asking if the helicopter's introduction to the Vietnam War enabled an unsound strategy, one can ask to what extent the US military is currently pursuing the proper balance between efficiency and effectiveness. The US military must increasingly shift its innovatively and adaptationally optimistic culture from asking whether it can do something to whether it should, recognizing tactical solutions do not solve strategic problems.³² Unfortunately, a can-do culture is not an unalloyed good.

Historically, the Marine Corps has been the most frugal of the services. Jokes abound of Marines using duct tape to solve just about any problem. Huey pilots, for example, have sometimes pointed to their ironically low-tech aiming device: a square piece of electrical tape affixed to the windshield to which they align with the target. Indeed, one their most heralded adaptations entailed what we would today call commercial off-the-shelf-technology: in the interwar period, Marines identified the Higgins boat—which began its life as a vessel to cruise Louisiana bayous—as a potential candidate for an amphibious landing vessel.

Today's Marine Corps is more profligate as exemplified by the opening vignette. The CH-53K is estimated to cost around \$135 million per aircraft, staggering given it is even more expensive than the much-maligned F-35.³³ The new platform is also anticipated to be used in joint forcible entry missions, thereby suggesting its employment

32. Special Inspector General for Afghanistan Reconstruction (SIGAR), *Quarterly Report to the United States Congress* (Washington, DC: SIGAR, July 30, 2021), 62, <https://www.sigar.mil/>.

33. David Daly, "Is \$138 Million for the CH-53K King Stallion Helicopter Justified?" *Defense Post*, August 31, 2020, <https://www.thedefensepost.com/>.

in an anti-access/area-denial environment.³⁴ The joint light tactical vehicle carrying the missile costs about \$350,000.³⁵ A naval strike missile costs \$2 million.³⁶ The Corps envisions employing these missiles from the ground as a kind of artillery force for the Navy.³⁷

The cost of the Marine Corps' attempt to support the Navy in the kind of mass needed in a peer conflict cannot be scaled efficiently. This highly expensive tactical solution exemplifies what T.X. Hammes has characterized as the US military's embrace of the "exquisite few."³⁸ While one often thinks of temperamental capabilities like the F-35 as epitomizing the "exquisite few," in reality it far better encapsulates how the US military tries to solve problems on a wider scale.

No wonder, then, that the Corps recently admitted it needs more funding, claiming it has cut all possible waste.³⁹ In the past, though, it has pursued more cost-effective adaptations such as a plywood glider drone to air drop supplies.⁴⁰ Even the US service with a reputation for thrifty innovation and adaptation has gone adrift.

Army Combat Fitness Test

The Marine Corps is not alone in this approach to tactical adaptation, as evident in the relatively new and costly Army combat fitness test (ACFT), which requires about \$30 million in new equipment alone. The test claims to make fitter, more combat-ready soldiers.⁴¹ While the justification—improved combat efficiency—for the fitness test is compelling, the reality is that only about thirty percent of the Army consists of combat elements, having steadily fallen from a peak of about 50 percent in World War I, except for a brief period during the surge in Operation Iraqi Freedom.⁴²

Builder's insights into institutional culture illuminate how the fitness test is partly about the Army seeking to revitalize its purportedly lost-warrior ethos. Some Army

34. "Marine Corps Prepares New CH-53K for First Flight," *Military News*, October 21, 2014, <https://www.military.com/>.

35. Sydney J. Freedberg Jr., "JLTV: New \$911M Order Strengthens Oshkosh's Hand for Recompete," *Breaking Defense*, December 2, 2020, <https://breakingdefense.com/>.

36. David Wichner, "Navy Details Plan to Deploy New Raytheon Anti-Ship Missile," *Arizona Daily Star*, April 30, 2021, <https://tucson.com/>.

37. Ben Wan Beng Ho, "Shortfalls in the Marine Corps' EABO Concept," *Proceedings* 146, no. 7 (July 2020), <https://www.usni.org/>.

38. T. X. Hammes, "The Future of Warfare: Small, Many, Smart vs. Few & Exquisite?," *War on the Rocks*, July 16, 2014, <https://warontherocks.com/2014/07/the-future-of-warfare-small-many-vs-few-exquisite/>.

39. Patricia Kime, "At the Limits of What I Can Do: Marine Corps Commandant Makes Plea for Funding," *Military News*, June 16, 2021, <https://www.military.com/>.

40. Kyle Mizokami, "The Marines Are Testing a Glider Drone Made of Plywood," *Popular Mechanics*, April 20, 2017, <https://www.popularmechanics.com/>.

41. Matthew Cow, "Full Details: The Army Finally Reveals Future Combat Fitness Test," *military.com*, July 8, 2018, <https://www.military.com/>.

42. John J. McGrath, *The Other End of the Spear: The Tooth-to-Tail Ratio (T3R) in Modern Military Operations* (Fort Leavenworth, KS: Combat Studies Institute Press, 2007), <https://www.armyupress.army.mil/>.

leaders insist “[c]ombat is age and gender-neutral.” Yet after six years of preliminary testing, the new fitness test retained age and gender bias: the Army sought to determine the new test’s effectiveness drawing on a sample size of 136 men and only 16 women, with a relatively low average age of 24. 16 women out of a sample set of 152 underrepresented women in its testing.⁴³ The Army should have experimented with a more representative gender balance in developing the test.

The Army also argues the new test “measures a Soldier’s physical ability to execute combat-related tasks.” It follows this text with an image of a soldier deadlifting 340 pounds to achieve “maximum points.”⁴⁴ What is left unclear is how a slew of kettlebells, pulling sleds, 3000 pounds of weights, and other equipment approximate combat enough to necessitate such a far-reaching and costly test.

The test epitomizes an approach to perfecting Army physical fitness or focusing on effectiveness while discarding efficiency or other more practical and far less costly approaches to improving a culture of Army physical fitness.

As such, the Army’s approach exemplifies Weigley’s American way of war, a definition that includes the acceptance of vast inefficiencies as part of the cost of the military achieving its desired effects. In the development of the ACFT, the Army demanded the gold standard of equipment and what it believed offered the most effectiveness, regardless of efficiency. Since announcing the test and revealing that the equipment would cost \$30 million, that number has increased three years later to \$63.5 million, or just under one-half the cost of a CH-53K.⁴⁵

Adaptation and innovation, both peacetime and wartime, are critical to military success. But the services must carefully apply a cost-benefit analysis to their actions in an era of limited budgets that demands the military scrupulously allocate funds. The culture of adaptation and innovation adopted by the US military in recent years is crucial to revitalize increasingly outdated legacy equipment. But so much is required that the US military cannot afford the gold-standard approach except when absolutely necessary, and, in the case of the new ACFT, the ability to deadlift 340 pounds is of minimal use to the majority of Soldiers. There will be no feats of strength or Crossfit gyms on the battlefields of tomorrow.

43. Emma Moore, “The ACFT and the Problems with the Military’s Cult of Physical Fitness,” December 16, 2019, <https://www.military.com/>; Jillian Hamilton, “Congress Pauses ACTF until Independent Study Completed,” January 4, 2021, <https://news.clearancejobs.com/>; Kyle A. Novak, *A Critical Review of the Baseline Soldier Physical Readiness Requirements Study*, American Statistical Association Foundation, November 19, 2020, <https://kylenovak29.s3.amazonaws.com/>; and David Brown, “ACFT FUBAR: Bad Data Driving a Bigger Wedge between Active Duty and Reserve,” News and Career Advice, ClearanceJobs, May 12, 2021, <https://news.clearancejobs.com/>.

44. Thomas Brading, “ACFT 3.0: Exploring a More Inclusive Scoring Assessment, Planks Stay,” Army News Service, March 22, 2021, <https://www.army.mil/>.

45. Steve Beynon, “For Guard and Reserve Soldiers without Easy Access to Equipment, ACFT Training Costs Pile Up,” June 3, 2021, <https://www.military.com/>.

The Air Force and JADC2

With the drawdown in Iraq and, more recently, Afghanistan, the US military has quickly turned to preparing for more high-end, conventional conflict. But it has struggled to determine the ultimate purpose for adaptation and innovation, lacking a sound strategy for pursuing great power competition. If nothing else, the US military must come to terms with the reality that one cannot win simply by selecting “winning” weapons. Today’s military professionals can no longer assume—if they ever should have to begin with—they can “win” by “virtue of our overwhelming dominance in military power.” Indeed, this assumption has resulted in “diluted operational doctrine and clouded concept development.”⁴⁶

Two decades of strategic struggle in pursuit of victory over terrorism led to a batten-down of the hatches. The military sought to do what it had done so well tactically over the last twenty years, namely, speed up and make the kill chain more lethal when rules of engagement allowed. Additionally, over the last decade, the US military has insisted this process could best be enabled by making each domain’s capabilities more seamless and interconnected.

The Air Force eagerly subscribed to this approach, seeking to develop technologies as the leading enabler of connecting all the devices. In 2020, Air Force Chief of Staff General David L. Goldfein sought to incorporate technology similar to the Uber App into the Air Force, insisting it would provide a seamless solution for increasing the kill chain’s speed, explaining, “You match a vehicle with a target . . . and you can see it all happen. You’ve got options you can pick from, you can see the driver, the license plate, you can watch that person coming towards you. You start thinking about that application militarily . . . it’s exciting.”⁴⁷

This process may be exciting, but Vinsel reveals the limits of what is a very complicated process, highlighting how “digital-age companies” struggle when they “encounter old problems in their new ventures in the material world” including logistics, ethical norms, and other considerations.⁴⁸ The military cannot afford to get it wrong when a product must be reliable amid the fog and friction of war.

Over the last five years, all-domain operations morphed out of the concept of multi-domain battle, which initially sought to reconstitute the improved relations between the Army and the Air Force that made air-land battle doctrine possible back in the late 1970s and early 1980s. But if air-land battle doctrine at least consisted of a basic idea of how to employ force to win by attacking the first- and second- echelon forces, all-domain operations is an amorphous emphasis on simply speeding up the kill chain and doing more of the same. In this way, it is technologically deterministic at its core.

46. Frank Hoffman, “Defeat Mechanisms in Modern Warfare,” *Parameters* 51, no. 4 (Winter 2021), <https://press.armywarcollege.edu/>.

47. David Roza, “The Air Force Is Using Uber-Like Technology to More Efficiently Vaporize Bad Guys,” *Task & Purpose*, January 27, 2020, <https://taskandpurpose.com/>.

48. Vinsel, *Innovation Delusion*, 9.

If anything, the failed political outcome of Afghanistan, a conflict in which the US military had air superiority and a speedy kill chain, shows the hollowness of this idea as the main solution to preparing for high-intensity conflict with near-peer or peer competitors.

Some might argue that Joint all-domain command and control (JADC2) is based more on ideas than on technology, namely that of maneuver warfare.⁴⁹ Unfortunately, maneuver warfare has not proven itself. In effect, maneuver warfare better suits the ideal world than the real one. Lawrence Freedman argues in this vein that maneuver warfare relies on an “essentially romantic and nostalgic view of strategy.”⁵⁰ Cathal Nolan echoes these critiques by describing how maneuver warfare enthalls military professionals with the “quick fix: the sudden Blitzkrieg, the rapid war of maneuver, the sweeping brilliance of the great captain.”⁵¹

Consequently, maneuver warfare ideas such as “creating multiple dilemmas for the enemy” coexist at odds with principles of war such as simplicity and concentration. The fog and friction of war make it highly challenging the United States will be able to create short-lived but synchronized “windows of opportunity.”⁵² Other issues abound such as requiring vulnerable space, cyber, and electromagnetic capabilities with technological fetishisms potentially blinding some to what potential enemies can do well and cheaply.

An additional point about motives for adaptation and innovation should be noted, namely, the “process of innovation itself can be corrupted into one of institutional self-interest and self-protection,” a characteristic shared by each military service.⁵³ It can be argued, for example, that the Air Force has pursued technologies like the advanced battle management system in part because it sought to ensure its continued importance.⁵⁴ While there are many advantages to JADC2 that will be invaluable in a highly-contested environment, the Air Force should appropriately balance efforts to innovate and adapt in this realm to innovate and adapt with enablers possessing the kind of mass required to bring enough strategic effect to bear.

Some have suggested the Air Force has been adrift in its identity since strategic bombing lost its grip as the locus of institutional culture.⁵⁵ In some ways, the subsequent development of fighters equipped with precision weapons, sophisticated sen-

49. James B. Hecker, “Foreword: Joint All Domain Operations,” *Air & Space Power Journal* 35, no. 2 (Summer 2021): 2, <https://www.airuniversity.af.edu/>.

50. Lawrence Freedman, *Strategy: A History* (New York: Oxford University Press, 2013), 210.

51. Cathal Nolan, *The Allure of Battle: A History of How Wars Have Been Won and Lost* (New York: Oxford University Press, 2016), Introduction.

52. Juan Canovas, “Multi-Domain Operations and Challenges to Air Power,” Joint Air Power Competence Centre, 2019, <https://www.japcc.org/>.

53. Mrozek, *Ideas and Actions*, 71.

54. Valerie Insinna, “What’s the End Game for the US Air Force’s Command and Control Overhaul?,” C4ISRNET, May 21, 2019, <https://www.c4isrnet.com/>.

55. Ed Kaplan, *To Kill Nations: American Air Strategy in the Air-Atomic Age and the Rise of Mutually Assured Destruction* (Ithaca, NY: Cornell University Press, 2015), vii–viii.

sors, and stealth technology enabled them to perform more efficiently in a kind of role akin to strategic bombers, allowing precision to somewhat function as an acceptable substitute for strategic bombing in Air Force identity.

Yet three of the four services now have stealthy fighters equipped with precision weapons and sophisticated sensors, raising legitimate questions about how the Air Force truly differs.⁵⁶ Of course no other service can match the Air Force in sustaining capabilities like tankers, intelligence, surveillance, and reconnaissance platforms, and other aircraft. In effect, the Air Force provides a wide, holistic set of air capabilities across the broad range of military operations. The combination of these capabilities and being more attuned to how to employ airpower flexibly explain the need for an independent Air Force.

With the advent of JADC2, some Air Force leaders may be signaling that command and control more than air superiority justifies continued Air Force independence and deserves emphasis as its most important role. This change gains credence when considering the degree to which recent events appear to echo previous air superiority challenges experienced by other militaries, such as the Yom Kippur War in 1973, in which the ground element of the Israeli Defense Forces helped the air component secure air superiority.⁵⁷

Conclusion

Slogans such as “accelerate change or lose” must be pursued thoughtfully and carefully. As Black argues, “there is a widespread belief that superior technology is always the answer without understanding what the question is.”⁵⁸ Without a sound strategy, the pursuit of innovation and adaptation can be counterproductive.

Helicopters represented a highly innovative development that made many key contributions to the Vietnam War, but the air mobile concept enabled the Army, in large part, to make just enough body count progress to pursue a failed military strategy. The Marine Corps’ latest use of expensive technology to show the feasibility of its operational concept may or may not make sense. After all, using a helicopter equal in cost to an F-35—itself possibly a question mark in contested airspace—to ferry a missile to an island outpost vies for the crown of most expensive Uber ride short of space tourism.⁵⁹ If the platform is used to advance questionable operational or strategic concepts that flounder or fail in wartime, it may prove to be the most costly.

Just because a service can do something does not mean that it should. The services should debate the prudent level of effort for proofs of concept in a Joint context. It is one thing to have an idea and work through the problem of operationalizing it. But if

56. Robert M. Farley, *Grounded: The Case for Abolishing the U.S. Air Force* (Lexington: University Press of Kentucky, 2014).

57. Insinna, “End Game.”

58. Black, *War and Technology*, 30.

59. Greg Hadley, “F-35 Not as Survivable as Previously Hoped, HASC Chair Says,” *Air Force Magazine*, August 30, 2021, <https://www.airforcemag.com/>.

war broke out, more survivable options might prove better in terms of solutions, such as a kind of quiet cargo submarine (one might harken back to the submarines of World War I, which were more submersible boats than submarines).⁶⁰

Change is critical, but so often the call to accelerate change ignores the great continuities in warfare, such as anticipating war's fog and friction, which provide just as many insights into sound preparation. Certainly there is a time and place for appropriate exquisite capabilities. At times the Air Force recognizes this reality, perhaps having realized of late the importance of mass. The service may be struggling now, as the other services are, to conceptualize and balance a high/low force structure mix.⁶¹

Striking the correct balance between change and continuity is difficult. As one person once warned the United States, "if a chariot pulled by four inferior horses [was] pitted against one pulled by four superior horses, this often [led] to the defeat of the chariot pulled by the superior horses."⁶² However counterintuitive this idea might seem, it can be true of technology employed against terrorist organizations as well as of technology employed against near-peer and peer adversaries.

How does the US military make a "grounded projection into the future" rather than hewing to "fantastical" theories of future conflict?⁶³ Is a full table saw required or will the \$10 saw suffice for a project? Without a sound strategy in place, one ends up pursuing a number of disparate projects akin to beginning a number of home improvement projects on a house for which the building plans have yet to be fleshed out. A sound strategy will help the services answer the requisite preliminary question when it comes to the decision to innovate or adapt: we can, but should we? And, if we pursue innovation or adaptation in one area, what other area must be neglected because of that choice? Æ

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60. Also see Collin Fox, "Taking Notes from Narcos: Semi Submersible Unmanned Ships for Great Power Competition," Capability Analysis, Center for International Maritime Security, May 1, 2020, <https://cimsec.org/>.

61. John A. Tirpak, "Air Force Moving toward Multi-Domain Munitions, away from 'Exquisite' Types," *Air Force Magazine*, November 30, 2021, <https://www.airforcemag.com>.

62. Quoted in James Sbraga, "Southeast Asia," in *Case Studies in the Development of Close Air Support*, ed. Benjamin Franklin Cooling (Washington, DC: Office of Air Force History, 1990), 440.

63. H. R. McMaster, "Foreword," in *Learning the Lessons of Modern War*, ed. Thomas G. Mahnken (Stanford, CA: Stanford University Press, 2020), xvi.

THE USAF AT 75

RENEWING OUR DEMOCRATIC ETHOS

MARYBETH P. ULRICH

Countering threats to American democracy is a vital national interest. Civics literacy and the development of a democratic ethos must be fostered in Americans beginning in early childhood, but the military plays a role in national democratic renewal as well. On the occasion of its 75th birthday, the US Air Force must draw upon its heritage, renewing a commitment to a democratic ethos that preferences service members' obligation to the Oath of Office above partisan or personal interests.

This year, 2022, marks the seventy-fifth anniversary of a separate US Air Force. In 1947, six months before the birth of the United States Air Force, President Harry S. Truman committed the United States to a policy “to support free peoples who are resisting attempted subjugation by armed minorities or by outside pressures.”¹ The Truman Doctrine equated the spread of authoritarianism with a threat to the security of the United States. The United States Air Force became the newest tool among US instruments of power to secure the continued viability of American democracy and the revitalization of its democratic allies in the aftermath of World War II.

In 1947, Americans largely trusted their government and respected and understood its democratic institutions.² Indeed, the narrative sustained on the home front and in the theaters of war was that American servicemen fought to rid the world of the tyrannical Axis powers and secure the democracies these powers had threatened. But much of the civic consciousness that underpinned the Army Air Forces' and its successor US Air Force's achievements in the Cold War has changed, with potentially catastrophic effects.

The service now focuses largely on great power competition and its technological edge; both are strategic ends that rightly demand the attention of the nation's political and military leadership. The threats stemming from great power competition and from losing our technology-based advantages are accompanied, however, by another,

1. “The Truman Doctrine, 1947,” US Department of State, Office of the Historian (website), <https://history.state.gov/>.

2. “History of Civics Education in the United States,” Research 4SC, n. d., accessed January 14, 2022, <https://research4sc.org/>.

more insidious threat gathering from within the American domestic political system. This new menace is rooted in a decline in civic understanding in society at large, complacent citizenship, and insufficient development of a professional military ethos steeped in democratic civil-military relations.

Countering threats to American democracy from abroad and from within must be elevated to the most vital of national interests. A grassroots and national effort could enable civics literacy and the development of a democratic ethos in the citizenry from the earliest age. The military also has a role in national democratic renewal. The US Air Force in particular, on the occasion of its diamond anniversary, must draw upon its heritage and also renew its commitment to a democratic ethos that places service members' obligation to the Oath of Office above partisan or personal interests.

In short, the service must adopt a multi-dimensional approach to its professional ethos to include both a democratic ethos and a warrior ethos. The current nearly exclusive emphasis on warrior ethos focuses on "how we fight," not "why we fight." A comprehensive program of professional development across all levels of professional military education (PME) is needed to develop Air Force professionals steeped in an understanding of American democracy and democratic civil-military relations norms that complement their warrior ethos. Such Airmen will be well versed in the constitutional obligations that anchor their military service. They will enjoy the increased confidence of the citizenry and internalize a love of country that will underpin their will to fight to preserve its ideals. A look back at the Army Air Forces' democratic ethos offers some lessons for today's Airmen.

Why the Army Air Forces Fought

On January 6, 1941, President Franklin D. Roosevelt argued in his annual State of the Union address to Congress that America was contributing its "arsenal of democracy" to the war to preserve the "four freedoms": the freedom of speech, the freedom of worship, the freedom from want, and the freedom from fear.³ These principles symbolized America's rationale for supporting the war and were the precursors to the 1942 Atlantic Charter's war aims that laid out the parameters of a postwar global order.

Promoting a democratic ethos was also a priority of the armed forces. In 1942, General George C. Marshall, Army chief of staff and architect of the war effort at home, recruited Hollywood director and Signal Corps major Frank Capra to produce a series of orientation films for service members undergoing their initial training with the purpose of "maintaining morale and instilling loyalty and discipline."

The result was the seven-film *Why We Fight* series that explained to service members and civilians that the purpose of the massive effort to defeat the Axis powers was to defend American values. The films focused on aspects of American life that were worth fighting for. For example, the first film, *Prelude to War*, drew attention to

3. "FDR and the Four Freedoms Speech," National Archives: Franklin D. Roosevelt Presidential Museum and Library (website), <https://www.fdrlibrary.org/>.

President Abraham Lincoln's Gettysburg Address that declared "government of the people, by the people, for the people, shall not perish from the earth."⁴ The message was clear. American GIs were charged with continuing the cause of American democracy.

The generation that served in the Army Air Forces and who were the first to fill the ranks of the new Air Force came of age at a time when civics played a central role in public education. Consequently, they were well grounded in the fundamentals of American democracy. The Air Force was able to draw on this democratic ethos in the development of its professional ethos.

A key tool in this respect was S. L. A. Marshall's *The Armed Forces Officer*, a Department of Defense pamphlet first published in 1950 at the request of Secretary of Defense George C. Marshall. Secretary Marshall held the "personal conviction that American military officers, of whatever service, should share common ground ethically and morally."⁵

This comprehensive guide to officership started with an explanation of the officer's oath and commission. The first sentence described the officer's commission as "a lasting obligation" that is not "lessened on the day an officer puts the uniform aside and returns to civil life."⁶ The guide continued, "an officer is expected so to maintain himself, and so to exert his influence for so long as he may live, that he will be recognized as a worthy symbol of all that is best in the national character."⁷ There is no breakdown of constitutional processes that the service member has sworn to "protect and defend," but the guide alluded to the officer's assumed knowledge of these processes.

A main point is that on becoming an officer a man does not renounce any part of his fundamental character as an American citizen. He has simply signed on for the post graduate course where one learns how to exercise authority in accordance with the spirit of liberty. The nature of his trusteeship has been subtly expressed by an Admiral in our service: "The American philosophy places the individual above the state. It distrusts personal power and coercion. It denies the existence of indispensable men. It asserts the supremacy of principle."⁸

Richard Swain and Albert Pierce updated *The Armed Forces Officer* in 2007 and 2017. The 2017 guide still opens with a discussion of the commission and oath, explaining that the execution of the constitutional oath activates the commission.⁹ Swain and Pierce acknowledge the oath's charge "to well and faithfully discharge the duties of the office" but note the nature of those duties is undefined "beyond the shared purpose of protecting and defending the Constitution."¹⁰

4. Ashley S. Behringer, "Why We Fight: Prelude to War, America's Crash History Lesson," *The Unwritten Record* (blog), The National Archives, September 1, 2020, <https://unwritten-record.blogs.archives.gov/>.

5. Richard M. Swain and Albert C. Pierce, *The Armed Forces Officer* (Washington, DC: National Defense University, 2017), preface, <https://ndupress.ndu.edu/>.

6. S. L. A. Marshall, *The Armed Forces Officer* (Washington, DC: Department of Defense, 1950), 6, <https://www.usna.edu/>.

7. Marshall, *Armed Forces Officer*, 6.

8. Marshall, *Armed Forces Officer*, 9.

9. Swain and Pierce, *Armed Forces Officer*, 5.

10. Swain and Pierce, *Armed Forces Officer*, 5.

They conclude this foundational part of the guide by laying out some expectations in the civil-military relationship with regard to honorable service. “The guarantee of that service is internalization in every officer of the expectations embodied in the commission and the oath: patriotism, valor, fidelity, and abilities; dedication to the protection of the letter of and the values embodied in the Constitution; and a willingness to offer, if required, what President Lincoln called ‘the last full measure of devotion’ in its defense.”¹¹

Among other influential tools that the Department of Defense has to shape the professional ethos of its service members are *Developing Today’s Joint Officers for Tomorrow’s Ways of War: The Joint Chiefs of Staff Vision and Guidance for Professional Military Education & Talent Management* and *Chairman of the Joint Chiefs of Staff Instruction: Officer Professional Military Education Policy*, both published in May 2020. These documents give broad PME guidance to the military services.

The Chairman of the Joint Chiefs of Staff vision document highlights the importance of “intellectual overmatch” and continually exercising “new intellectual skills” to sustain America’s competitive advantage.¹² The emphasis is on the accelerating pace of new technologies and the global integration of national power. There is no mention, however, of educating service members to address domestic threats of any kind, nor is there any indication that PME should play a role in ensuring service members have a deep understanding of their oaths and commissions. The document does emphasize the use of case studies, games, and exercises—educational methodologies that could be leveraged to include a civics-consciousness component in PME.¹³

The Chairman of the Joint Chiefs of Staff Instruction goes into more detail in support of the Joint Chiefs of Staff vision. Figure A-1, Officer Professional Military Education Continuum, includes the focus of military education at each of the five levels of PME, from precommissioning to the general/flag officer capstone course. Currently, the US Constitution and US government are only highlighted at the precommissioning level of PME.¹⁴

In addition, one of the six Joint learning areas is the profession of arms, and the Instruction notes, “joint officers are first and foremost members of the profession of arms, sworn to support and defend the Constitution, with specialized knowledge in the art and science of war.”¹⁵ But the document does not further elaborate on the substance of the expert knowledge applicable to carrying out officers’ constitutional oaths or the deep understanding of the civic notions that tie military professionalism to the support of democratic processes.

11. Swain and Pierce, *Armed Forces Officer*, 10.

12. Chairman of the Joint Chiefs of Staff (CJCS), *Developing Today’s Joint Officers for Tomorrow’s Ways of War: The Joint Chiefs of Staff Vision and Guidance for Professional Military Education & Talent Management* (Washington, DC: CJCS May 1, 2020), <https://www.jcs.mil/>.

13. CJCS, *Talent Management*.

14. CJCS, *Officer Professional Military Education Policy*, CJCS Instruction (CJCSI) 1800.01F (Washington, DC: CJCS, May 15, 2020), A-15, <https://www.jcs.mil/>.

15. CJCS, CJCSI-1800.01F, A-A-1.

The 1950 and 2017 editions of *The Armed Forces Officer* span 67 of the Air Force's 75 years. Both assume well-formed citizens have elected to take up arms in the service of their country, but studies show the American educational system is not producing such citizens. A 2020 national survey by the Annenberg Public Policy Center found a quarter of Americans cannot name a single branch of government, and only 51 percent could name all three branches.¹⁶

In terms of knowledge of the military's role in democracy, a 2014 YouGov survey found American civilians surveyed favored the elected political leadership deferring to military experts on national security policy, a position in conflict with democratic norms of civil-military relations.¹⁷ The centrality of civics in American education has eroded over time to the point where it garners less than 10 percent of classroom time and 5 cents per student per year compared to \$54 per student annually spent on science, technology, engineering, and math education.¹⁸ As a result, young people entering the armed forces generally lack the understanding of citizenship and civic consciousness necessary to fulfill their oaths of enlistment and commissioning.

The Department of Defense's cultivation of a democratic ethos within its professional ethos has simply not kept pace with the national decline in civics education, the erosion of democratic norms, and the concurrent decline in democratic norms of civil-military relations.¹⁹ Richard Kohn, former Air Force historian and professor emeritus at the University of North Carolina, alerted US Air Force Academy cadets to this trend of declining norms more than 20 years ago.

In his 1999 Harmon Lecture, Kohn noted cracks in the foundation needed to support the military's democratic professional ethos. These essential pillars of democracy include respect for the rule of law; reverence for the Constitution; intolerance for "any violation of the Constitution or its process," which neither any branch of government nor the public would support; and the armed forces' internalization of their subordination to civil authority as the foundation of military professionalism.²⁰

16. Annenberg Civics Knowledge Survey, "Amid Pandemic and Protests, Civics Survey Finds Americans Know More of Their Rights," Annenberg Public Policy Center, September 14, 2020, <https://www.annenbergpublicpolicycenter.org/>.

17. Kori Schake and James Mattis, *Warriors and Civilians: American Views of Our Military* (Stanford, CA: Hoover Institution Press, 2016), 299.

18. Rebecca Burgess, "Civic Education, the Essential Substrata of Military and National Service," American Enterprise Institute, July 5, 2019, <https://www.aei.org/>; and Suzanne Spaulding, "Civics as a National Security Imperative: A Conversation with Senior Military Officers," Center for Strategic and International Studies, December 14, 2020, <https://www.csis.org/>.

19. Steven Levitsky and Daniel Ziblatt, *How Democracies Die* (New York: Crown Publishing, 2018); Larry Diamond, *Ill Winds: Saving Democracy from Russian Rage, Chinese Ambition, and American Complacency* (New York: Penguin Press, 2019); and Marybeth P. Ulrich, "Civil-Military Relations Norms and Democracy: What Every Citizen Should Know," in *Reconsidering American Civil-Military Relations*, ed. Lionel Beehner, Risa Brooks, and Daniel Maurer (New York: Oxford University Press, 2021).

20. Richard H. Kohn, "The Erosion of Civilian Control of the Military in the United States Today," *The Harmon Memorial Lectures in Military History, 1988–2017* (Maxwell Air Force Base, AL: Air University Press, 2020), <https://www.airuniversity.af.edu/>.

Cracks in the Professional Ethos

On January 6, 2021, it was clear the cracks in the pillars of American democracy and its supporting professional military ethos had grown wider when a mob attacked the US Capitol, disrupting the congressional process of certifying the 2020 presidential election results. Many media reports in the first weeks after the insurrection headlined the military history of those involved in the attacks, often pointing out that these veterans, themselves, “had once sworn to protect the Constitution.”²¹

A December 2021 CBS News analysis determined at least 81 of the approximately 700 individuals charged for their participation in the insurrection had military ties. Most were veterans; however, one of those who breached the Capitol was an active duty Marine Corps major, four were active members of either the Army Reserve or National Guard, and one enlisted in the Army after the insurrection and was arrested at Fort Bragg in October 2021. CBS News reported that at least 36 had served in the Marine Corps, 28 in the Army, 3 in the Navy, and 5 in the Air Force.²²

One of the rioters charged with violent entry on Capitol grounds who was covered widely in media reports was Air Force veteran and 1989 Air Force Academy graduate Larry Brock Jr. Brock was photographed wearing combat gear and holding flex cuffs inside the Senate chamber. In the weeks between the election and the January 6th insurrection, Brock posted on Facebook referencing his belief that Joseph Biden was not the lawful president-elect. “I see no distinction between a group of Americans seizing power and governing with complete disregard to the Constitution and an invading force of Chinese communists accomplishing the same objective.”²³

Brock ended his post with a reference to his commissioning oath: “Against all enemies foreign and domestic.” Clearly, this Air Force veteran misunderstood the workings of American democracy regarding electoral integrity and that his obligation under his oath was to defend democratic processes—not subvert them.

Some judges have considered the military service of veterans involved in the January 6 insurrection to be an aggravating factor leading to harsher treatment in trial procedures and sentencing when convicted. When ruling against releasing retired Army Sergeant Jeffrey McKellop, an Iraq and Afghanistan War veteran, before trial, District Judge Carl Nichols noted McKellop’s military service suggests “he should have known better. I am more concerned about his conduct that day than I might have been if it was some random person.”²⁴

Magistrate Judge Michael Harvey similarly ruled that retired Army Ranger Specialist Robert Morss should remain in jail awaiting trial because he was “willing to use his

21. Tom Dreisbach and Meg Anderson, “Nearly 1 in 5 Defendants in Capitol Riot Cases Served in the Military,” National Public Radio, January 21, 2021, <https://www.npr.org/>.

22. Eleanor Watson and Robert Legare, “Over 80 of Those Charged in the January 6 Investigation Have Ties to the Military,” CBSNews, December 15, 2021, <https://www.cbsnews.com/>.

23. Dreisbach and Anderson, “Capitol Riot Cases.”

24. Marshall Cohen and Hannah Rabinowitz, “These Veterans Swore to Defend the Constitution; Now They’re Facing Jail Time for the US Capitol Riot,” CNN, November 9, 2021, <https://www.cnn.com/>.

training or experience to organize with the rioters” to subvert democracy, “thereby making their actions more effective, more forceful and more violent.”²⁵

Some Air Force veteran-rioters have atoned for their roles on January 6. Air Force veteran Thomas Vinson commented at his sentencing hearing, “I signed up for the Air Force to take care of and defend this country,” he said. “I took that oath to the Constitution and I know I broke that oath that day by entering that building and participating in the events of January 6. It’s a blemish that’s going to be on myself, my family, for the rest of my life, and the country, and into the history books.”²⁶ Vinson was sentenced to five years of probation, a \$5,000 fine, \$500 in restitution, and 120 hours of community service.²⁷

Retired Air Force Master Sergeant Jonathan Sanders also told the judge he had “failed” his extensive military training. “That was a personal failure on my part. I wasn’t coerced, I wasn’t tricked, I wasn’t pushed. . . . That failure on my part is uncharacteristic. I know that my family, my friends, the men and women I served with and especially the men and women who trained me expected better.”²⁸ Sanders was sentenced to probation rather than the higher sentencing guideline of six months in jail.

An Antidote to Extremism

A serious and deliberate effort to facilitate service members’ understanding of the Constitution and their oaths to uphold it would also contribute to mitigating the problem of extremism in the military. In the months after the January 6 insurrection, Secretary of Defense Lloyd Austin ordered a 60-day stand-down, a period of mandated discussion across units “to remind the country’s military personnel that the oath they took to support and defend the Constitution means that they cannot storm the Capitol to stop lawmakers from certifying election results they do not like.”²⁹

Military leaders have appealed to the oath as the linchpin of a professional ethos that does not tolerate extremists in the ranks. Austin noted that an overwhelming number of service members “respect the oath they took to support and defend the Constitution of the United States.” But those violating the oath through participation in extremist activities “can have an outsized impact on unit cohesion, morale and readiness, and the physical harm some of these activities can engender can undermine the safety of our people.”³⁰

25. Cohen and Rabinowitz, “Facing Jail Time.”

26. Cohen and Rabinowitz, “Facing Jail Time.”

27. Billy Kobin, “Kentucky Nurse, Air Force Veteran Sentenced for Their Roles in Jan. 6 Riot at US Capitol,” *Louisville Courier Journal*, October 22, 2021, <https://www.courier-journal.com/>.

28. Cohen and Rabinowitz, “Facing Jail Time.”

29. John Ismay and Helene Cooper, “After Capitol Riot, Pentagon Announces New Efforts to Weed Out Extremism among Troops,” *New York Times*, April 13, 2021, <https://www.nytimes.com/>.

30. Helene Cooper, “Pentagon Updates Its Rules on Extremism in the Military,” *New York Times*, December 20, 2021, <https://www.nytimes.com/>.

The Department of Defense policy released in December 2020 bans active participation in extremist groups and lists specific prohibited behaviors. These include “liking” or reposting extremist views on social media.³¹ In an effort to balance service members’ first amendment rights, membership in extremist organizations is not banned. This aspect of the policy has been controversial and is an example of when service members’ rights as citizens conflict with professional norms. In such situations, a robust democratic ethos must be relied upon to constrain service members’ behavior.

Air Force Chief of Staff General CQ Brown is one senior military leader who has appealed to the service’s professional ethos, and the oath specifically, to root out extremism. Brown remarked in an interview on the *PBS NewsHour* that “membership of an extremist organization—that goes against our core values, that goes against your oath and is not what we need in our military.” He added, “Those that don’t live up to our core values of integrity, service, and excellence, those that don’t stand up and hold themselves to the oath of office they take to the Constitution, those are the ones that we don’t need in our military.”³²

Fostering a Democratic Ethos

Chairman of the Joint Chiefs of Staff General Mark A. Milley and Brown have voiced their personal commitments to the oath and the American ideals it represents. What remains to be done is the hard work of integrating the civics education necessary to renew the US military’s democratic ethos. What should be included in a program of professional military education that aims to provide this understanding? Several military leaders have weighed in on this question, and the Air Force Academy’s Oath Project is leading the way in implementing many of their ideas.

The Oath Project, a joint cadet-faculty effort to reinvigorate education on the Oath of Office into the Cadet Wing’s academic and military programs, is a model for other military educational institutions and units to emulate.³³ The program seeks to integrate the development of a democratic ethos into academic courses, military training, and ceremonies where the oath is administered. Key components of the Oath Project are outlined below.

America and Its Constitutional Foundations

The Oath Project seeks to facilitate a deeper understanding of how American democracy works and why it is worth fighting for. Understanding the nation’s founding and the workings of the democratic system that the Founders established will

31. Lolita C. Baldor, “Pentagon Issues Rules Aimed at Stopping Rise of Extremism,” *PBS News Hour*, December 20, 2021, <https://www.pbs.org/>.

32. Nick Schifrin, “General Brown on Extremism in the Air Force, and Threats from China, Afghanistan,” *PBS News Hour*, July 28, 2021, <https://www.pbs.org/>.

33. Kelly E. Atkinson and Marybeth P. Ulrich, “Let’s Educate Service Members on Professional Ethos, Not Just Extremism,” *Hill*, June 6, 2021, <https://thehill.com/>.

strengthen Airmen's commitments to their oaths to defend it. Courses in political science, history, law, and leadership, among others, can be leveraged to explain democratic principles and to establish the historical-mindedness required for the development of a democratic ethos.

In a recent interview, former Secretary of Defense Robert M. Gates emphasized the imperative of teaching about the central role of compromise in American government:

That's what checks and balances are all about. Therefore, if you are willing to vote for people in Congress who have no intention of compromising, you don't understand how the American government is supposed to work—and that the only way to accomplish big things as a country is when members of Congress are willing to cross party lines or think about the interests of the country as a whole, and make compromises. No one gets his or her way all the time. That fundamental understanding of the criticality of compromise for the American experiment to work, I think, is a critical element of civics education.³⁴

Norms of Civil-Military Relations

A thorough understanding of American democracy will enable a strong understanding of the norms of civil-military relations. This is the subject area where professional Airmen can preserve democracy directly through their understanding of the role of democratic militaries. The central focus areas are: internalizing the principles of civilian control, nonpartisanship, and the relationship between armed forces and society in a democracy.

January 6th Insurrection Case Study

Airmen should be able to apply their understanding of constitutional foundations to the events of the January 6 insurrection. The Oath Project is developing curriculum that applies Airmen's understanding of the US democratic system to the conduct of elections.³⁵ Airmen should also be able to identify how the veterans who participated in the attacks misunderstood the democratic processes that govern elections and the peaceful transition of power. Reviewing the conduct of specific veterans and the consequences for their actions will help emphasize the professional norm and societal expectation that Airmen are members of the Air Force profession for life.

Ideological Geopolitical Competition

A comprehensive curriculum supporting the development of a democratic professional ethos also includes a comparative politics angle. Contrasting the United States's imperfect, but perfectible, model with authoritarian countries currently challenging

34. Juan Perez Jr., "Robert Gates: How Civics Education Became a National Security Issue," Politico, September 29, 2021, <https://www.politico.com/>.

35. Paul D. Eaton, Antonio M. Taguba, and Steven M. Anderson, "3 Retired Generals: The Military Must Prepare Now for a 2024 Insurrection," *Washington Post*, December 17, 2021, <https://www.washingtonpost.com/>.

the Western democratic model gives American service members important insights into the fragility of democracy at home and the shortcomings of the alternative models abroad.

President Biden has framed his foreign policy as a geopolitical competition between models of governance and has argued the United States must lead the effort in proving American democracy and its model of democratic capitalism still work.³⁶ But China and Russia are increasingly coordinating their efforts to undermine democracy and position their autocratic models as superior alternatives.³⁷ The appeal of American values of democracy, human rights, and adherence to the rule of law undergirds American soft power and is our edge over our autocratic competitors. Renewing this aspect of the democratic ethos bolsters Airmen's wills to fight for American ideals.

Democratic Ethos and the Oath

The Oath Project encourages Air Force leaders at every level to educate Airmen on their obligations under the oath and to model their personal commitment to it. In the past year, Milley has repeatedly emphasized the importance and meaning of the oath. In so doing he has modeled the role that military leaders can play in renewing their democratic ethos through education. "The Constitution of the United States—the moral North Star of all in uniform—is that document that gives purpose to our service."³⁸ In his graduation address to the US Air Force Academy Class of 2021, Milley instructed:

There are over 190 countries in the world that are in the United Nations, but . . . the United States . . . is the only one to have a military that swears an oath to an idea, an idea contained in a document. We don't swear an oath to a king, a queen, a tyrant, or a dictator. We don't swear an oath to a person, a tribe, or a religion. No, we swear an oath to an idea . . . the idea that is America.³⁹

The Oath Project has also prioritized including oath education in every ceremony where the oath is featured, inserting language explaining the oath in the ceremony where Basic cadets first take the oath, commissioning ceremonies of graduating cadets, promotion and re-enlistment ceremonies, convocations, and graduations. Retired Air Force General Lori Robinson has advocated for leaders using such occasions to demonstrate their understanding and adherence to democratic principles. "Talk

36. David E. Sanger, "Biden Defines His Underlying Challenge with China: 'Prove Democracy Works' " *New York Times*, March 26, 2021, <https://www.nytimes.com/>.

37. Steven Lee Myers, "An Alliance of Autocracies? China Wants to Lead a New World Order," *New York Times*, March 29, 2021, <https://www.nytimes.com/>.

38. "Gen. Milley: 'We Take an Oath to the Constitution,'" Associated Press, November 12, 2020, <https://www.youtube.com/>.

39. Mark Milley, "Joint Chiefs Chairman Delivers Commencement Speech to Air Force Academy's Class of 2021," 29:02 - 29:54, Department of Defense Videos, May 27, 2021, <https://dod.defense.gov/>.

about it all the time. Every time I did a promotion I would talk about why we swear the oath.”⁴⁰

Conclusion

The US Air Force will turn 75 years old on September 18, 2022—the day after Constitution Day, which commemorates the signing of the US Constitution on September 17, 1787. The Air Force can give the country a tremendous gift on its diamond anniversary—a recommitment to the democratic ethos that underpins the service of its Airmen. Understanding the responsibilities and obligations related to service members’ oaths should pervade professional development.

The US Air Force Academy Oath Project should be expanded to all commissioning sources, basic training, and postgraduate PME institutions. These programs should also be resourced and staffed to ensure they are sustained. Broadening the understanding of professional ethos to include the dual dimensions of democratic ethos and the currently pervasive warrior ethos will prepare Airmen who know both how to fight and what they are fighting for. A comprehensive effort to imbue service members in the constitutional obligations underpinning their service is the best way to commemorate the Air Force’s seventy-fifth birthday and the legacy of the airmen who served in the Army Air Forces in defense of American ideals. Æ

Marybeth P. Ulrich, PhD

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40. Lori Robinson, “Civics as a National Security Imperative: A Conversation with Senior Officers,” remarks at the Center for Strategic and International Studies online event, December 14, 2020, <https://www.csis.org/events/>.

SPACE IS A WARFIGHTING DOMAIN

EVERETT C. DOLMAN

The Space Capstone Publication opens with the declaration that space is a warfighting domain. This assertion has tremendous repercussions for force structure, budget decisions, public and international perceptions, and, perhaps most significantly, for the culture of the newest military service. The capstone publication sets a tone for military space responsibility that is long overdue.

Eight months after it was established, the nascent US Space Force published its initial doctrine. The Space Capstone Publication was the result of an intense study of who and what the force would become and the principles that lay behind that vision.¹ It opens with the unequivocal statement that space is a warfighting domain. This assertion has tremendous repercussions for force structure, budget decisions, public and international perceptions, and, perhaps most significantly, for the culture of the newest military service. The capstone publication sets a tone for military space responsibility that is long overdue.

In the 1980s and 1990s, I was a senior intelligence analyst at the original US Space Command. I assessed the space threat from the Soviet Union, then Russia, and China. The command would routinely conduct wargames, and within a few hours of a simulated crisis, the so-called red team often negated most of the blue team's on-orbit capabilities rendering the command strategically blind and deaf. This would prompt a heightened defense readiness condition (DEFCON) in anticipation of an invasion of Western Europe and a nuclear attack on American soil.

The consistent response from the blue team was to hit back hard from the air and sea, while ground forces braced to repel the coming assault. Accordingly, I was assigned to a team that developed and maintained a space-priority target list including launch sites, ground and tracking stations, and production facilities that the Air Force and Navy could be called upon to strike. The thinking was, we may lose the war *in* space, but at least we could try and deny the Russians access *to* space. It was a very dissatisfying position, especially since our ability to project power deep behind enemy lines was contingent upon continuing robust support from space.

1. John W. Raymond, *Spacepower: Doctrine for Space Forces*, Space Capstone Publication (Washington, DC: US Space Force, June 2020), <https://www.spaceforce.mil/>.

In 1991, Operation Desert Storm, which Sir Arthur C. Clarke dubbed the first space war, cemented the post-Vietnam revitalization of the American military, demonstrating the value space support provided and the tremendous potential of integrating space support in every aspect of military operations. By 2003, in Operation Iraqi Freedom, space support was a universally acknowledged force multiplier.

In this conflict, space assets provided long-range communications including operating remotely piloted vehicles anywhere in the world from bases in the United States. Space assets also provided navigation support, especially valuable in a featureless desert and for precise targeting, but were most lauded by coalition forces for allowing previously unimaginable battlespace coordination known as blue-force tracking. Precise weather and terrain condition data and unprecedented continuous real-time reconnaissance, surveillance, intelligence, and early warning support were also notable advantages provided by space assets.

At about the same time, Air Force and civilian government representatives were admonishing the services for becoming over-reliant on space support—support that could not be guaranteed in a future conflict. Despite repeated and consistent warnings, the nation's unwillingness to defend space had not changed. In a war with a determined and tech-savvy opponent, and more so with a peer competitor, ubiquitous jamming, spoofing, lasing, and directed-energy strikes, and increasingly sophisticated ground-to-space kinetic antisatellite targeting was inevitable. Space support was too fragile to rely upon. The services, they insisted, had to ensure back-up capability to continue the fight as effectively without space as they had become used to fighting with it.

This stance was short-sighted at best and promised disastrous defeat at worst. Space support was presented as a luxury—nice to have but not a requirement. The message received by the other services was if they were on their own to ensure fully redundant warfighting effectiveness without it, why was space needed at all? With limited budgets and resources, what was the advantage in having both?

In reality, space provides a powerful asymmetric advantage in the modern battlespace. Twenty years of training and wargaming to operate without space confirms that when space support is shut off, US military operations grind to a halt. Spacepower is not an extravagance. It makes America and its Ally and partner militaries leaner, faster, and more precisely deadly. To operate effectively without space, the US military would have to revert to a Vietnam-era force structure: bloated, slower, and vastly more accepting of casualties and collateral damage. Spacepower may be the foundation of America's twenty-first century way of war, but the official line has been: don't count on it.

The first order of Space Force business was to reject the mindset that loss of space support in a conflict is a given, and that complete loss should be expected. No doubt space will be targeted and degraded in a future conflict. So too will every other form of military support. Not every aircraft will get through, nor every platoon or ship. The response—the same as that from the other services—was that you may not get every-

thing you want, but now the Space Force would battle for every shred of capability throughout the spectrum of conflict.

By declaring space a warfighting domain, the US Space Force accepted the responsibility that ensuring access to and support from space, and denying space to an adversary when required, would be Job One.

Differentiating Military Spacepower

Spacepower is the totality of a state's space research, resources, production and trade, infrastructure, and innovation contributing to national security and economic well-being. By declaring space a warfighting domain, military spacepower is recognized as a *subset* of the whole while highlighting the roles and functions expected of a dedicated military service. These functions include the martial capacity of the state to deter, protect, and defend against threats to all the nation's space capabilities, and to use those capabilities to support military and military-related operations in other domains.

A warfighting domain is an abstract construct that allows for critical analyses of those activities that properly belong to the military, separating them from civil, commercial, and international activities that are tightly connected. The point is not to declare that space is only for warfighting, that war in space is inevitable, or that spacepower is exclusive to the military. Such a declaration, instead, functions to clarify and delineate relationships.

Unlike the other forms of military domain power, spacepower suffers from a lack of useful terminology to distinguish it from more encompassing descriptions. Landpower is easy enough to contemplate as the missions and capabilities of the Army without misconstruing it as the entirety of the military-industrial-scientific complex. Seapower is relatively uncontroversial when it relates to the roles and missions of the Navy and is separated out from the broader notion of a nation's maritime power. Airpower has an equivalent concept in which the term aviation covers the totality of the nation's air-related capacities and allows for the roles and missions of the Air Force to be clearly stated in peace and conflict. Spacepower has not yet found its maritime/aviation terminology equivalent, and so the declaration of space as a warfighting domain must suffice for now.

Military spacepower is but one aspect of national spacepower. A great strength for America, for example, is its rapidly growing commercial space sector. Continued growth of this sector depends upon the delineation of the roles and functions of commercial space and an understanding of its relationship to other elements of national spacepower. In peacetime preparation for war, US Space Force will encourage commercial space development with military and dual-use potential primarily through service and procurement contracts.

As needed, the US government will augment military capacity with existing commercial assets through leases and other shared-use agreements. In extreme cases, the state may authorize temporary nationalization of civil and commercial capability similar to the historic use of the merchant marine as an augmenting force for the Navy. The Space Force will need to conduct contingency planning for all these scenarios.

Civil spacepower comprises space activities carried out by governments for basic scientific research, space exploration—robotic and human—and space programs that often have military and commercial significance but are not dedicated to military operations or not deemed profitable enough for commercial enterprise to take them on independently. These activities include space capabilities developed primarily for political or diplomatic influence, such as the 1960's moon race and the current International Space Station, and for projects that amount to essential space infrastructure such as launch facilities, ground support stations, space traffic management capabilities, global weather prediction, and back-up communications systems.

Civil spacepower also encompasses purely military-funded and maintained systems such as the Air Force's global positioning satellite (GPS) network that has become the indispensable underpinning of twenty-first-century international trade, production, and finance. Like the interstate highway system, rural electrification, and now expanding broadband access to underserved areas, civil, commercial, and military spacepower need to be recognized as foundational public services that enable and expand commercial, scientific, and military spacepower development.

Military spacepower is tightly linked with civil and commercial space. It can be studied exclusively in theory, as is attempted here, to clarify and explain proper relationships and hierarchies without the clutter and messiness of reality.

For example, as civil and commercial development expands into space, the military—the only legally recognized wielder of violence in international, nonsovereign, or commons areas—will be called upon to provide essential protective services. These services include search and rescue, debris and other obstacle removal, mitigation of international crime such as physical and electronic piracy and illicit trafficking, and numerous additional activities associated with making civil and commercial activities in space safe and reliable. This has been the pattern in the open oceans and the air-space above them and for ungoverned or nonsovereign territory such as the early American West or Antarctica today. In a phrase, flag follows commerce.

Defining Warfighting Domains

A warfighting domain is an organizational construct. It comprises an area of responsibility with a unique operational environment requiring specialized tactics, equipment, and structure. A warfighting domain, therefore, demands a different way of thinking within the broader context of military strategy. It requires specialized knowledge and training, unique tactics and doctrine, a distinct operational perspective, and a dedicated cadre of military professionals to advocate for and maximize combat power within and from the domain.

How the domain is defined determines the organizational construct of a state's military forces. An optimal definition eliminates organizational overlap and maximizes service interoperability through specialization—the key to making the whole more than the sum of its parts and the essence of Joint warfare.

The most common means of defining domains, however, exacerbate overlap and interoperability tensions. The first of these is simply separation by operational medium.

Land, sea, air, and space have distinct physical characteristics that can be summarized as solid, liquid, gas, and vacuum, respectively.

Overlap problems ensue when operating in or across domain boundaries. For example, who should be in overall command of a Joint force that operates in and from all mediums and across several component commands? Who should have command authority for—much less deconflict—a ballistic missile launched from a submarine that passes through the air, then space, air again, and impacts on land? Should there be a sequence of hand-offs, and if so, under what conditions?

More confusion results when service responsibility is determined by the operational platform used to access the domain. It seems simple enough. Aircraft should belong to the Air Force, seacraft to the Navy, spacecraft to the Space Force, and weaponry that moves across the ground to the Army. Call this the flies, floats, orbits, and walks differentiation.

Especially for aircraft, the problem is compounded. Should all forms of powered flight be considered airpower and thus the purview of the Air Force? Today the Air Force claims authority over fixed-wing aircraft, except for naval aircraft and helicopters (though it has helicopters), and the Army has a few airplanes. Since all services require land bases to support their operations, seaports, airports, and spaceports are all on land. This requires them to have wheeled and tracked vehicles as well as ground troops sufficient to protect the base.

When and under what circumstances should the Army send forces to augment them, and if so, which service should control them while defending the base from a concerted ground attack? Should an amphibious assault vehicle carrying soldiers belong to the Navy while at sea but be controlled by the land component when it reaches shore and rolls into battle? With these definitions, it is small wonder interservice rivalry is an art form.

An alternative domain discriminator that leads to an efficient and effective organizational structure ensues when warfighting domains are defined by power and purpose. The purpose of seapower, for example, is to ensure access to the sea for any who would do so for peaceful purpose and in conflict to deny that access to the opposition. The purpose of airpower is similarly to ensure access to the air and when called upon, deny that access to opposing forces. The purpose of landpower is to take and hold territory, essentially to ensure friendly access and deny opposing access when needed. Accordingly, the purpose of military spacepower should be to ensure access to space for all in peace and deny that access to opposing forces in conflict and war.

Achievement of guaranteed access to a warfighting domain and denial of that access to opponents is command of the domain. Capacity for command is the optimum military posture. Critically, if the assigned armed forces cannot gain command, they should still be prepared to contest access to the domain by opposition forces. Because the purpose is to deny access, contestation is expected from both within and from outside the domain. In order to command and contest the domain, the assigned service must maintain the ability to fight to, in, and from the domain.

Command does not have to be universal in space, time, or supremacy. Command can be general or local, permanent or temporary, and scaled from limited (contested) to total (uncontested). It is achieved when the military has the capacity to access the domain and provide effects from that domain with minimal or acceptable interference. Unquestionably, one cannot generate effects from the domain if one cannot operate in the domain. Thus a domain's purpose is not defined by what one does once access is achieved. It is not the purpose of the Air Force to support the fight on the ground or sea by aerial bombardment any more than it is the purpose of the Army to conduct nation-building operations. These are effects of achieving command.

When an aircraft bombs a factory, it is not conducting economic warfare, though it certainly has economic effects. It is exercising airpower. It is inappropriate to refer to bombing, shelling, or destroying a school as educational warfare or to call attacking a temple religious warfare. *The key point in these examples is that access and command is the purpose of domain power.* The effects that can be generated due to that access, from humanitarian aid to combat in, from, and through the domain are potentially infinite, limited only by imagination.

Defining a warfighting domain by purpose significantly reduces organizational conflicts and maximizes all-domain military effectiveness. First, whatever service is responsible for a warfighting domain should not be limited in acquiring the means (platforms) necessary to gain control of that domain and to deny access to it from other domains. This includes the ability to contest access to adjacent domains to prevent the opponent from generating unopposed effects from those domains.

Moreover, the services should be able to equip themselves with appropriate tools and weaponry for these purposes. The US Army, not the Navy, maintains coastal artillery, for example, because the purpose is not to command the sea but to prevent opposing navies from attacking the shore and supporting ground operations including amphibious assaults. Likewise, the Army maintains air defense capabilities not for the purpose of commanding the air (though it may help in that regard), but for denying (contesting) the enemy's ability to operate freely above it. No matter how thorough the ground-to-air contestation, it is possible, even likely, that the enemy is able to contest that same airspace. In this case, neither side has command; it is mutually contested.

This brings up a critical and extremely useful corollary to the logic of defining domains by purpose. A warfighting domain cannot be commanded from an adjacent domain, it can only be contested. The service assigned to the domain must be able to operate on (land and sea) or in (air and space) the domain to gain command—the animating purpose of domain warfare. Thus ground command can only be achieved with boots on the ground. Comparative adages might be stated as sea command is only possible with oars in the water, air command with wings in the air, and space command with satellites in orbit.

To highlight the corollary, airpower could in theory scour the ground of all opposition—bomb it flat, perhaps. *From* the air, though, one cannot do anything with the ground. Aircraft cannot rebuild structures, maintain roads, or farm crops.

Airpower may deliver workers and supplies to support those efforts but cannot by itself command it.

Another example might be suspicion of human trafficking on the high seas. Aircraft can intercept the boat, monitor it, and even sink it. But unless it can operate on the ocean, board the ship, inspect it, remove the victims, transport them to a safe haven, take those responsible into custody, seize the ship for evidence or reparations, and get it to port, airpower does not have sea command of that location at that time. The ability to fight *in* the domain, and *from* the domain to support the fight in other domains, should be the guiding principle of domain-centric definitions. Military spacepower, as portrayed in the context of a warfighting domain, must be perceived in precisely the same way.

Purpose obviates the petty squabbles highlighted above associated with medium- or platform-based definitions. If a capability is needed to command the domain and prevent others from attacking into it, then procure it. The Army should be able to determine what level of dedicated combat support aircraft it needs to take and hold territory and, if the Air Force cannot gain command of the air above it, to contest the air domain.

The Air Force needs ground-attack aircraft to remove obstacles to air operations such as radars, surface-to-air missiles, and enemy airfields and can support the fight on the ground with those same aircraft once command is achieved. The Navy should have sea- and land-based aircraft to efficiently support command of the sea and to assist in contestation of land adjacent to and the skies above the sea.

In the same way, the Space Force should have the weapons and resources it needs to fight in, to, and from space. It should not rely on other services to fight for it, because command of space will always be secondary to command of their primary domains, as it should be. Only with command of their own domains can the other services then contest the space domain. Equally important, the ability to operate in the domain ensures assets and capabilities located there can support other domains. With the ability to operate in space, the Space Force would be the best positioned to deter and defend against hostile action in space and, accordingly, provide effects from space.

Understanding warfighting domains as bounded by purpose provides an additional efficiency. Assignment of operational control of a Joint or combined mission is determined by identifying the primary supported service. A campaign in which ground troops are expected to take and hold territory, supported by sea, air, and space forces, should be under the overall command of the Army.

If command of the sea is required and naval assets are either the primary or sole combat force, clearly an admiral should be in charge. If access to the air is required and air assets are the primary or sole combat force employed, it should be under the overall command of an Airman. The same logic should hold if and when space is the focal area of operations or Space Force assets will be the primary combat force; it should be commanded by a Guardian.

A Dedicated Military Service

I have argued elsewhere that the purpose of military power is not to win wars, for that would mean whenever the military is not engaged in war, much less winning, then it is not fulfilling its purpose and should therefore be abandoned.² Rather, the purpose of the military is to be prepared, and when called upon by the legitimate governing authority, to maximize violence within the constraints and limitations placed upon it by that authority. This broad purpose allows for peacetime training and readiness, recognizes civilian control over the military, and highlights the role of violence in war so to discourage casual or inappropriate use of the military.

Note that maximizing violence is contextual, not spasmodic. A single bullet or bomb can maximize violence depending on the target of a military response, and spacepower support is essential to America's ability to precisely target and thereby limit collateral damage and casualties. Note, too, that this is not a definition that requires warfighting. Its definition is based upon the ancient military axiom (paraphrased), *si vic pacem, para bellum*. If you want peace, prepare for war.

Preparation is also the essence of deterrence. To the extent that one party can credibly threaten others with unacceptable harm should they violate some specified condition, that party can reasonably presume the others will comply. Deterrence requires both capability and the will to carry out the deterrent threat. Without both, deterrence is not credible and may even provoke the action it is meant to deter.

Even so, deterrence only works until it doesn't, and then it fails utterly. When the other party believes it can achieve what it wants despite the deterrent threat, it may very well violate conditions set by the deterring party. When that happens, the only option left is to defend the object of the deterrent threat or to concede it.

For too long America has relied solely on the deterrent threat of a terrestrial-based response to prevent an attack on any of its space-based assets. There are at least two problems with this. Since the deterrent *threat* is usually a forward projection of power via land, sea, or air forces, and since those attacks increasingly require the support of space forces to work with precision and efficiency, the *capability* of the threat is undermined. Second, since an effective space attack is unlikely to directly and immediately harm human beings, a response on Earth that could get people killed lacks both proportionality and reciprocity—thereby undermining the *will* to respond.

Space warfare is different than operational warfare in other domains and requires specialized warfighting expertise, but it is not different in the essential principles of war. The context changes but not the strategy. Today, no state relies more on spacepower for its national security and economic well-being than the United States. Space provides an asymmetric advantage for America, its Allies, and its partners. If something were to occur to take space away—some combination of solar flares, micrometeorite showers, or hostile attacks—the resulting economic crisis would be globally

2. See Everett Carl Dolman, *Pure Strategy: Power and Principle in the Space Age and Information Age* (New York: Frank Cass, 2005).

crippling. Transportation and electrical power infrastructure would seize, internet commerce and international finance would stop cold, and food production would plummet. America's ability to project force abroad would, at least temporarily, halt.

Accordingly, the US Space Force is charged with ensuring free and unfettered access to space for all who would go there with peaceful intent, but in times of conflict or war, it must ensure access to America, its Allies, and partners while *denying that access* to its enemies. Currently, the Space Force must do that with no combat ability *in or from* space. Can you imagine the Navy having the mission to ensure access to the oceans in time of peace, but to deny that access to US adversaries in time of war (which is its mission, by the way), and do so without placing weapons on board ships, boats, or submarines? The Navy would say you're out of your mind. If a military service is denied weapons—its tools—then give the job to someone else.

Conclusion

No one should want to fight a war in space, or in any other domain for that matter. Yet, nation-states have not abolished war nor discarded their military capacity. Military power persists to deter hostile states and organizations, to defend the state when deterrence fails, and to intervene beyond the state's borders when other methods are unlikely to succeed.

Today we face an historical paradox. For the first time in modern history, a state that relies on access to an area known to be *vital* for its national defense and security—the loss of which would be an Achilles heel—like Achilles, refuses to defend or even protect this critical area. The world cannot afford to lose access to space, and America must be prepared to defend space assets should they be threatened and attacked. If the US Space Force is expected to accept the role of martial defender of space, then it must be allowed to develop, deploy, and operate weapons *in* space.

To do so, the culture and mindset of the newest military service must change—Guardians must think and act like warfighters. Because of the global nature and vast distances of space operations, only weapons in space can defend determined attacks into and within space, and the only military service that can prioritize space defense is the US Space Force. By declaring space a warfighting domain, the US Space Force has embraced the logic that will maximize its value in the Joint fight. Æ

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ACCELERATE CHANGE OR LOSE THE INFORMATION WAR

KAREN GUTTIERI

The United States Air Force must accelerate change or lose an information-cyber war that is already hot and holds at risk American social, economic, and political cohesion. The Air Force has launched promising organizational and technological initiatives including an “integration imperative” recognizing the interdisciplinary, techno-sociological character of information warfare. At the same time, the Air Force has removed cyber from its mission statement. Moreover, force development does not progress past digital literacy, cyber hygiene, and information technology training. To win, the Air Force must develop and promote strategists to overcome vulnerabilities and seize opportunities in the cyberspace domain and information environment.

In August 2020, General CQ Brown Jr., chief of staff of the United States Air Force, warned of “rapid technology development and diffusion” driving change in the strategic environment.¹ American innovations of the late twentieth century had delivered instant global connectivity, operational technology, geographic positioning, and other capabilities that changed daily life and shaped relative military power and power projection.² Twenty years later, American economic, social, and warfighting advantages from these advances are eroding. The Air Force’s high-tech, robustly networked systems and the highly networked public they protect have become large attack surfaces. In response, Brown ordered, “accelerate change or lose.”

In October 2020, a Joint Force wargame showed how loss might play out. By admission of the Vice Chairman of the Joint Chiefs of Staff General John E. Hyten, the US Joint warfighting concept “failed miserably” when the red team denied US forces *in the information environment*, impairing communications and command and control, and rendering useless many key capabilities.³ The wargame invalidated twenty-

1. Charles Q. Brown Jr., *Accelerate Change Or Lose* (Washington, DC: Headquarters, Department of the Air Force, August, 2020), 1. The author would like to thank Kevin L. Parker and Contessa Hannig for their essential advice and insight during the drafting of this article.

2. Brown, *Accelerate Change*, 4.

3. Emphasis added. John E. Hyten remarks on defense technology at the Emerging Technologies Institute, July 26, 2021, Video, 12:21, <https://www.c-span.org/>; and Chris Dougherty “Confronting Chaos: A New Concept for Information Advantage,” War on the Rocks, September 9, 2021, <https://warontherocks.com/>.

year-old assumptions. The United States could no longer take information superiority for granted.

Information warfare—a concept that involves both technical and human elements—is already a hot war. China spies, steals blueprints of American warplanes, and purloins massive amounts of personal data. Russia reaches through cyberspace to attempt to disrupt American elections and deliver propaganda that further divides everyday Americans. “Our adversaries have brought strategic competition to the nation’s front door,” writes Sixteenth Air Force Commander General Timothy Haugh, “by engaging the United States’ population in the information environment.”⁴ With this in mind, what are the prospects for the Air Force to “accelerate change or lose” the information war?

Historically, multiple forces drive military change. Civilian intervention, an external force, is one, but this article will instead focus on two drivers the Air Force controls—strategic assessment and officer development.⁵ Assessment that leads to reconsideration of a strategic goal or the concept of operations in relation to that goal is an impetus to change.⁶ This is happening today. Militaries also change through officer development and promotion. This element of Brown’s action order “A”—develop Airmen—needs attention.

The Information War

“Plus, China and Russia are trying to take out our internet every day. People really like the internet. They’re always checking it.”

- Steve Carell as General Mark R. Naird

The fictional commander of Space Force, General Mark Naird, in the television comedy of the same name, complained to his therapy group of constant attacks.⁷ In 2019, the real-life Air Force lieutenant general responsible for Air Force cyber and intelligence declared, “Right now, today, in the cyber domain, in information operations, I am not at peace. I am in persistent conflict.”⁸ A Russian diplomat later echoed her comment, saying, “The war [in cyberspace] is underway and unfolding very intensively. No matter how hard we may try to say that all this is disguised and that it

4. Timothy D. Haugh, Nicholas J. Hall, and Eugene H. Fan, “16th Air Force and Convergence for the Information War,” *Cyber Defense Review* (Summer 2020): 30.

5. Deborah D. Avant, *Political Institutions and Military Change: Lessons from Peripheral Wars* (Ithaca, NY: Cornell University Press, 1994); and Stephen Peter Rosen, *Winning the Next War* (Ithaca NY: Cornell University Press, 1991).

6. Rosen, *Next War*, 7.

7. Eriq Gardner, “Trump’s Space Force Already Lost Its First Battle,” *Hollywood Reporter*, June 5, 2020, <https://www.hollywoodreporter.com>.

8. VeraLinn Jamieson, quoted in Shaun Waterman, “Cyber Flight Plan Outlines USAF Efforts to Take on Hybrid Warfare,” *Air Force Magazine*, September 19, 2019, <https://www.airforcemag.com/>.

isn't that war or this war, in actual fact, military activities in cyberspace are in full swing."⁹ Dynamic cyberattack maps illustrate the complexity of the battlespace.¹⁰

Scholars debate what this all means. Some see it as hyperbole because the confrontation is mostly waged as espionage, subversion, and sabotage.¹¹ Others argue nonkinetic cyber operations merely support kinetic operations.¹² Those critics miss the point that the nonkinetic fight is reshaping any future kinetic battlefield, and perhaps overshadowing the relevance of the kinetic battlefield.

Information warfare is "the employment of military capabilities in and through the information environment to deliberately affect adversary human and system behavior and to preserve friendly freedom of action during cooperation, competition, and conflict."¹³ This not-yet-doctrinal description is consistent with the mid-twentieth-century cybernetics field's interest in control of industrial production and thought processes and its depiction of community as a function of information transmission.¹⁴ It aligns with Russian and Chinese constructs of information warfare as involving technical *and social* components.

Information warfare was first introduced by American scientist Thomas P. Rona in a 1976 study anticipating advances in human use of the electromagnetic spectrum.¹⁵ Rona explained an aerial attack as an information system, reliant on electronics, computation, and communications, with complex internal and external information flows. Pilots using fly-by-wire do not directly maneuver their aircraft with mechanical links. Instead, a computer reads the pilot's input to determine what signals to send the control actuators for yaw, pitch, and roll.¹⁶ Systems are vulnerable at the seams of external information flow.

Discussion of information warfare intensified in the 1990s after US success in the Gulf War. Advanced command, control, communications, intelligence, surveillance, and reconnaissance capabilities, instantaneous communications, global positioning technologies, and precision strike capabilities gave the US game-changing advantages.

9. "Full-Blown Warfare in Cyberspace in Progress, Says Russian Diplomat," Tass News Agency, December 16, 2021, <https://tass.com/world/1376491>.

10. Fireeye "Cyber Threat Map," accessed January 12, 2022, <https://www.fireeye.com/>; and National Security Archive, "CyberWar Map," accessed January 12, 2022, <https://embed.kumu.io/>.

11. Thomas Rid, *Cyber War Will Not Take Place* (Oxford: Oxford University Press, 2018).

12. Martin C. Libicki, *Cyberspace in Peace and War* (Annapolis, MD: Naval Institute Press, 2016), 161.

13. George M. Reynolds, "Achieving Convergence in the Information Environment," *Air & Space Power Journal* 34, no. 4 (Winter 2020): 6; and Sandeep Mulgund, "Memorandum for: C2 of Operations in the Information Environment (OIE) Working Group" (Washington, DC: Department of the Air Force, A3, September 15, 2020).

14. Norbert Wiener, *Cybernetics or Control and Communication in the Animal and the Machine*, Reissue of the 1961 2nd ed. (Cambridge, MA: MIT Press, 2019); and Alexander Klimburg, *The Darkening Web* (London: Penguin, 2017), 23–25, 219.

15. Thomas P. Rona, *Weapon Systems and Information War* (Seattle, WA: Boeing Aerospace Company, 1976).

16. Ilie Nicolin and Bogdan Adrian Nicolin, "The Fly-by-Wire System," *INCAS Bulletin* 11, no. 4 (December 2019), <https://www.researchgate.net/>.

The United States Air Force owned the skies. The then-Soviet Russians called this a military-technical revolution; Americans called it a revolution in military affairs.

The Department of Defense fostered the internet, but the private sector soon became the locus of information technology innovation.¹⁷ In fact, the Air Force now looks to the private sector for “IT as a Service,” to free military cyber experts from information technology duties in order to focus on the more critical offensive and defensive cyber operations.¹⁸ Amazon Web Services partners with the Air Force to test cloud capabilities at the tactical edge.¹⁹ Military acquisition and logistics personnel and defense innovation units navigate a complex innovation ecosystem, leveraging and relying on private-sector advances.

In about 2013, America’s competitors began to catch up. General Paul M. Nakasone, commander of US Cyber Command and director of the National Security Agency, referred to “a strategic inflection point” in which adversaries began operating “continuously against critical infrastructure, government networks, defense industries, and academia—both in America and abroad.”²⁰ Technology dependence created increasingly complex vulnerabilities, many in the civilian sector outside the control of the military.

Today, information vulnerabilities extend to space. Satellites, their ground stations, and data links are essential to communications, computing and network systems, geographic positioning, weather prediction, satellite TV and radio, phones, broadband, air traffic control, even telling the time.²¹ Russia and China threaten with antisatellite weapons, but the Department of Defense Space Development Agency director worries more about cyber and supply-chain exploitations. “It doesn’t matter if I have one satellite or if I have 1,000 satellites, those type of attacks may have the ability to take them all out.”²²

And people really like the internet. On December 7, 2021, Amazon Web Services—controlling 33 percent of the global cloud infrastructure—suffered an outage. Parts of Amazon’s enormous retail operations ground to a halt; iRobot Roomba vacuums resisted orders; and websites dropped offline, including learning management programs,

17. Karen Guttieri, “Governance, Innovation, and Information and Communications Technology for Civil-Military Interactions,” *Stability* 3, no. 1 (2014): 6. doi:10.5334/.

18. K. Houston Waters, “Air Force Deploys Commercial IT Capability,” Air Force Public Affairs, October 7, 2020, <https://www.af.mil/>.

19. Amazon Web Services (AWS) Public Sector Blog Team, “Bringing Cloud Capability to the Air Force at the ‘Speed of Mission Need,’” AWS Public Sector Blog, May 7, 2021, <https://aws.amazon.com/>.

20. Paul M. Nakasone, “A Cyber Force for Persistent Operations,” *Joint Force Quarterly* 92 (1st Quarter 2019): 11, <https://ndupress.ndu.edu/>.

21. Meg King and Sophie Goguichvili, “Cybersecurity Threats in Space: A Roadmap for Future Policy,” Ctrl Forward (blog) Science and Technology Innovation Program, Wilson Center, October 8, 2020, <https://www.wilsoncenter.org/>.

22. Sandra Irwin, “DoD Space Agency: Cyber Attacks, Not Missiles, Are the Most Worrisome Threat to Satellites,” *Space News*, April 14, 2021, <https://spacenews.com/>.

causing universities to cancel exams during finals week.²³ While the incident is a cautionary tale for the Air Force as it shifts its basic computing services to this commercial sector, it could be much worse.

Cyberattacks can seize control of an operating system to produce physical effects. In 2010, the Stuxnet worm, the first known virus to cripple hardware, caused some of Iran's nuclear reactors to self-destruct. In February 2021, a hacker using remote-access software broke into the control system of a municipal water treatment facility and attempted to increase lye in the water to harmful levels.²⁴

The US Cybersecurity Infrastructure Security Agency identifies sixteen sectors as critical infrastructure meaning "incapacitation or destruction would have a debilitating effect on security, national economic security, national public health or safety."²⁵ Some say cyber weapons are strategic because an attack on critical infrastructure could harm large civilian populations.²⁶ Indeed, this issue is discussed widely in United Nations and other international fora.

Still, cyber weapons do have their limitations. Zero-day opportunities are time limited because once known they can be patched. The intruder must manage a trade-off between maintaining an opportunity for espionage and the execution of malware that could divulge their presence in the system. An effective hacker must be aware of the complex physical and social systems of the target.²⁷

And malware once released can boomerang. The National Security Agency developed cyber tools that were stolen by the Shadow Brokers group and released beginning August 2016.²⁸ Purportedly among these was EternalBlue, a penetration tool. In 2017, North Korean hackers used EternalBlue in the WannaCry ransomware attack that affected computers in more than 150 countries and crippled the United Kingdom's National Health Service for days.²⁹ Then Russian military hackers used it in the

23. Annie Palmer, "Dead Roombas, Stranded Packages and Delayed Exams: How the AWS Outage Wreaked Havoc across the US," CNBC (online), December 9, 2021, <https://www.cnbc.com/>.

24. Andy Greenberg, "A Hacker Tried to Poison a Florida City's Water Supply, Officials Say," *Wired*, February 8, 2021, <https://www.wired.com/>.

25. "Critical Infrastructure Sectors," Cybersecurity and Infrastructure Security Agency (website), n. d., accessed January 13, 2022, <https://www.cisa.gov/critical-infrastructure-sectors>.

26. Sarah Kreps and Jacquelyn Schneider, "Escalation Firebreaks in the Cyber, Conventional, and Nuclear Domains: Moving beyond Effects-Based Logics," *Journal of Cybersecurity* 5, no. 1 (2019), <https://academic.oup.com/>.

27. "Critical Infrastructure Sectors," Cybersecurity and Infrastructure Security Agency (website), n. d., accessed January 13, 2022, <https://www.cisa.gov/>; and M. A. Thomas, "Unleashing the US Military's Thinking about Cyber Power," *War on the Rocks*, November 4, 2021.

28. Scott Shane, Nicole Perlroth, and David E. Sanger, "Security Breach and Spilled Secrets Have Shaken the NSA to Its Core," *New York Times*, November 12, 2017, <https://www.nytimes.com/>; and Lily Hay Newman, "The Leaked NSA Spy Tool that Hacked the World," *Wired*, March 7, 2018, <https://www.wired.com/>.

29. Roger Collier, "NHS Ransomware Attack Spreads Worldwide," *Canadian Medical Association Journal*, 189, no. 22 (June 2017): E786-87, <https://doi.org/>.

NotPetya attack that caused billions in damage worldwide.³⁰ Initially targeting Ukraine, NotPetya spread rapidly, affecting systems around the world, including Rosneft, Russia's state oil company.³¹

Like the IT serving them, social systems are wired for connectivity. Social media interaction and outsourcing cognition have made US military personnel, other national security practitioners, and everyday Americans prime targets for online psychological manipulation.³² And online behavior has proven successful at shaping behavior in real life. In 2016 Russians, seeking to widen partisan US divisions, used fake Facebook accounts and armies of bots and trolls to attract Americans to at least eight political campaign rallies, including competing events on the same day in New York City.³³

The internet empowers social mobilization at speed and scale with global reach at low cost.³⁴ Weapons like those employed by Russia enable states to attack below the threshold of armed conflict in the so-called gray zone. Anonymity offers weaker actors an opportunity to inflict pain without consequences. Attribution is difficult and doing so reveals one's own abilities. For these reasons, many believe cyberspace operations favor the offense.³⁵ Indeed, current US policy might be characterized as the best defense is a good offense.

The US strategy is "persistent engagement" through cyberspace. "We will defend forward to disrupt or halt malicious cyber activity at its source, including activity that falls below the level of armed conflict."³⁶ This requires continuous access, but an intrusion intended to defend can also provide cover for an attack. In 2007, Israeli planes hacked Syrian air defenses on the ground so the Syrians would not detect incoming Israeli strikes against a suspected nuclear reactor complex.³⁷ In other words, one

30. US Department of Justice (USDOJ) Office of Public Affairs, "North Korean Regime-Backed Programmer Charged with Conspiracy to Conduct Multiple Cyber Attacks and Intrusions," USDOJ (website) September 6, 2018, <https://www.justice.gov/>; and USDOJ Office of Public Affairs, "Six Russian GRU Officers Charged in Connection with Worldwide Deployment of Destructive Malware and Other Disruptive actions in Cyberspace," USDOJ (website) October 19, 2020, <https://www.justice.gov/>.

31. Andy Greenberg, "The Untold Story of NotPetya, the Most Devastating Cyberattack in History," *Wired*, August 22, 2018, <https://www.wired.com/>.

32. Rosanna E. Guadagno and Karen Guttieri, "Fake News and Information Warfare," in *Research Anthology on Fake News, Political Warfare, and Combatting the Spread of Misinformation*, ed. Mehdi Khosrow-Pour (Hershey, PA: IGI Global, 2020).

33. Alicia Parlapiano and Jasmine C. Lee, "The Propaganda Tools Used by Russians to Influence the 2016 Election," *New York Times*, February 16, 2018, <https://www.nytimes.com/>.

34. Kevin L. Parker, "The Utility of Cyberpower," *Military Review* 94, no. 3 (2014); and Audrey Kurth Cronin, "Cyber-Mobilization: The New Levée En Masse," *Parameters* 36, no. 2 (2006), <https://press.armywarcollege.edu/>.

35. Joseph S. Nye Jr., "Cyber Power," paper (Cambridge, MA: Belfer Center for Science and International Affairs, Harvard Kennedy School, May 2020), 5, <https://www.belfercenter.org/>; and William J. Lynn III, "Defending a New Domain," *Foreign Affairs* (September/October 2010), <https://www.foreignaffairs.com/>.

36. US Department of Defense (DOD), *Summary: Department of Defense Cyber Strategy 2018* (Washington, DC: DOD, 2018), <https://media.defense.gov/>.

37. Kim Zetter, "Hacker Lexicon: What Are CNE and CNA?" *Wired*, July 6, 2016, <https://www.wired.com/>.

cannot assume an electronic attack will be confined to a single purpose. The resulting risk of unintended escalation amounts to a cybersecurity dilemma.³⁸

Strategic Competitors in the Information Environment

The 2018 *United States National Cyber Strategy* declared, “persistent engagement in cyberspace is already altering the strategic balance of power.”³⁹ The US Intelligence Community in its *2021 Annual Threat Assessment* reports greatest concern about China, Russia, Iran and North Korea.⁴⁰ These adversaries seek access to critical infrastructure and to undermine, through digital influence campaigns, the American public’s confidence in institutions and the confidence of Allies and partners in American foreign policy commitments. Airmen and Guardians must understand the mindsets of America’s most powerful competitors in cyberspace, China and Russia.

China

The Intelligence Community describes China’s agenda as “the expansion of technology-driven authoritarianism around the world.”⁴¹ The People’s Republic of China is the global leader in surveillance and censorship technology. The government worries information technology might aid social mobilization and seeks internal sovereign control. China launched an internet-based censorship and surveillance program called the “Golden Shield Project” in 2003, also known as the “Great Firewall of China.”⁴²

The People’s Republic of China has forced concessions from American corporations including Apple, Disney, Facebook, Google, and Microsoft. Apple, for example, portrayed disputed islands on its maps as larger than they are, and Facebook ran Chinese government advertisements denying persecution of Uyghur Muslims.⁴³ The Chinese Central Propaganda Department’s media censorship extends to Hollywood.⁴⁴ China thus exerts an authoritarian variant of soft power.

38. Ben Buchanan, *The Cybersecurity Dilemma: Hacking, Trust and Fear between Nations* (Oxford: Oxford University Press, 2017).

39. Donald J. Trump, *National Cyber Strategy of the United States of America* (Washington DC: The White House, September 2018), <https://trumpwhitehouse.archives.gov/>.

40. Office of the Director of National Intelligence (ODNI), *Annual Threat Assessment of the US Intelligence Community* (Washington, DC: ODNI, April 9, 2021), 8, 10–11, 14, 15–16, <https://www.dni.gov/>.

41. ODNI, *Annual Threat Assessment*.

42. The International Institute for Strategic Studies (IISS), “Cyber Capabilities and National Power: A Net Assessment,” research paper, IISS (blog), June 28, 2021, 89, <https://www.iiss.org/>.

43. Katie Canales, “How Silicon Valley Came to Depend on China for Success—and Why It’s Bent Over Backward to Stay in the Government’s Good Graces,” *Business Insider*, December 15, 2021, <https://www.businessinsider.com/>.

44. James Tager, *Made in Hollywood, Censored by Beijing* (New York: PEN America, September 2020), <https://pen.org/>.

The Chinese domestic development strategy includes a “military-civil fusion” of science and technology industries.⁴⁵ Huawei, founded in 1987 by a former engineer in China’s People’s Liberation Army, is currently the world’s largest telecommunications equipment manufacturer.⁴⁶ Many countries, including the United States, Australia, Japan, and some European states, ban Chinese technology firms from their 5G infrastructure over security concerns. China is developing other markets.

The Digital Silk Road initiative, part of China’s global Belt and Road Initiative since 2015, builds information networks and infrastructure to position China to set technology standards and to extend the reach of its surveillance and content control.⁴⁷ Each month a billion people spend time on the Chinese video app TikTok that rivals Silicon Valley’s most notorious persuasive technology for its addictiveness and ability to read the minds of its users.⁴⁸ Its algorithm keeps users engaged while the app siphons, at user consent, massive amounts of personal data.

China reorganized stovepiped agencies into the Chinese Strategic Support Forces in 2015 to bring together cyber espionage and psychological warfare.⁴⁹ Chinese espionage imperils US industry and national security. Hackers linked to the People’s Liberation Army are believed to have stolen information about the F-35 stealth fighter, the Air Force’s F-22 platform, and numerous other weapon systems from the B-2 stealth bomber to space-based lasers.⁵⁰

In 2020, the US Attorney General indicted four Chinese military hackers, linking large-scale data thefts from the US Office of Personnel Management, Marriott hotels, Anthem insurance, and Equifax to the Chinese government.⁵¹ These are not one-off heists; they are part of an integrated campaign. Chinese intelligence services have used this combination of travel, health, credit, and other information to identify US intelligence officers, and to identify and target recruits.⁵²

45. Office of the Secretary of Defense (OSD), *Military and Security Developments Involving the People’s Republic of China 2021: Report to Congress* (Washington, DC: OSD, November 3, 2021), IV, <https://media.defense.gov/>.

46. Stephen P. Mulligan and Chris D. Linebaugh, *Huawei and US Law*, R46693 (Washington, DC: Congressional Research Service, February 21, 2021), summary, <https://crsreports.congress.gov/>.

47. Joshua Kurlantzick, “Assessing China’s Digital Silk Road Initiative: A Transformative Approach to Technology Financing or a Danger to Freedoms,” interactive article, Council on Foreign Relations, December 18, 2020, <https://www.cfr.org/>.

48. Ben Smith, “How TikTok Reads Your Mind,” *New York Times*, December 5, 2021, <https://www.nytimes.com/>.

49. IISS, “Net Assessment,” 91–92.

50. Eli Fuhrman, “How China Stole the Designs for the F-35 Stealth Fighter,” 1945, July 15, 2021, <https://www.19fortyfive.com/>.

51. Garrett M. Graff, “China’s Hacking Spree Will Have a Decades-Long Fallout,” *Wired*, February 11, 2020, <https://www.wired.com/>.

52. Richard J. Harknett and Max Smeets, “Cyber Campaigns and Strategic Outcomes,” *Journal of Strategic Studies* (published online March 2020), <https://doi.org/>.

Russia

The Intelligence Community considers Russia a top cyber threat with demonstrated capabilities including cyber espionage, influence operations, and attack (the ability to damage infrastructure such as underwater cables and industrial control systems during a crisis). Russia added “information-operations troops” to the armed forces in 2017 to conduct both cyber and information operations, including traditional psychological operations.⁵³ Russian President Vladimir Putin is said to personally control a centralized cyber-governance structure, yet many cyberattacks and influence campaigns are conducted by proxies such as the St. Petersburg-based Internet Research Agency.⁵⁴

Yevgeny Prigozhin, a businessman linked to Putin, was the primary funder of the Internet Research Agency. The United States charges that Prigozhin purchased computer server space in the country, created fictitious personas, and stole identities of actual Americans in the effort to influence the 2016 presidential election.⁵⁵ Prigozhin leads the Wagner Group, a proxy organization for the Russian state known for malign operations in Central African Republic, Libya, Mali, Mozambique, Syria, Sudan, and Ukraine.

The United States and the European Union sanctioned the Wagner Group for “destabilizing activities” such as fake election monitoring and other information operations, and “serious human rights abuses, including torture and extrajudicial, summary or arbitrary executions and killings, or in destabilizing activities in some of the countries they operate in.”⁵⁶ The Russian government denies involvement.

Operating from a weaker position, Russia employs a “raiding” strategy, harassing the United States and making territorial gains in the former Soviet sphere of influence.⁵⁷ Russia uses Estonia, Georgia, and Ukraine as testing ranges for cyber weapons. In January 2022, amid rising tension including 100,000 Russian troop deployments on the border of Ukraine, a destructive malware appeared in Ukraine government computers, defacing the websites. Microsoft identified a malware that poses as ransomware and when activated, is capable of destroying files and wiping hard drives.⁵⁸

Russia ramped up its social media campaign encouraging Russian speakers within Ukraine to support military action. Meanwhile, a US official warned of a possible

53. IISS, “Net Assessment,” 104.

54. IISS, “Net Assessment,” 103.

55. FBI Counterintelligence, “Yevgeniy Viktorovich Prigozhin3.pdf,” Most Wanted (website) n. d., accessed January 16, 2022, <https://www.fbi.gov/>.

56. “EU Sanctions Target Russian ‘Wagner’ Mercenary Group,” Deutsche Welle, December 13, 2021, <https://www.dw.com/>.

57. Michael Kofman, “Raiding and International Brigandry: Russia’s Strategy for Great Power Competition,” War on the Rocks, June 14, 2018, <https://warontherocks.com/>.

58. David E. Sanger, “Microsoft Warns of Destructive Cyberattack on Ukrainian Computer Networks,” *New York Times*, January 16, 2022, <https://www.nytimes.com/>.

Russian “false flag” operation, involving Russian sabotage of its own allies within Ukraine, as a pretext to invade.⁵⁹

Russian Army Chief of Staff Valery Gerasimov emphasizes roles for information, cyberwarfare, propaganda, and deception. “The role of nonmilitary means of achieving political and strategic goals has grown, and, in many cases, they have exceeded the power of force of weapons in their effectiveness.”⁶⁰ Russia uses civilian proxies, unidentified local and Russian agents, bribery, intimidation, agitation, assassination, and denial of operations.⁶¹

Russia’s information confrontation has two faces: (1) information-technical, or cyber—networks, exfiltration, and infrastructure; and (2) information-psychological—operations that aim to influence, sow doubt, erode faith in public institutions, erode the will to fight, divide, and debilitate. The SolarWinds hack in 2020, attributed to the Russian intelligence service (SVR), is an example of the former.⁶² SolarWinds compromised thousands of Americans as well as many government entities including the Departments of Defense, Treasury, Justice, and Energy, and the Cybersecurity and Infrastructure Security Agency.

Russia used both technical and psychological approaches to interference in the US 2016 election.⁶³ Russia conducted technical “computer-intrusion operations” against election infrastructure and the campaign of Hillary Rodham Clinton. Russian information—psychological operations included the release of the documents and other direct engagement with Americans.⁶⁴ In 2016, Russians purchased at least 3,500 ads on Facebook. Many ads and posts by Russian trolls or bots disguised the identity of the persona.⁶⁵ Russian trolls studied American perceptions, motivations, stressors, and attitudes to identify vulnerabilities and susceptibility to influence. A fake “Army of Jesus,” for example, targeted religious American audiences.⁶⁶ The Internet Research Agency stoked antagonism on both sides prior to the ultimately deadly political rally in Charlottesville, Virginia in August 2017.⁶⁷

59. Brooke Singman, “Russia Preparing False-Flag Operation as Pretext for Ukraine Invasion, US Warns,” Fox News, January 14, 2022, <https://www.foxnews.com/>.

60. Valery Gerasimov, “The Value of War Is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying Out Combat Operations,” *Military Review* (January-February 2016): 24.

61. *Little Green Men: A Primer on Modern Russian Unconventional Warfare, Ukraine, 2013–2014*, unclassified vers. (Fort Bragg, NC: United States Army Special Operations Command, 2015).

62. Dina Temple Raston, “A ‘Worst Nightmare’ Cyberattack: The Untold Story of the SolarWinds Hack,” All Things Considered, National Public Radio, April 16, 2021, <https://www.npr.org/>.

63. Robert S. Mueller, III, *Report on the Investigation into Russian Interference in the 2016 Presidential Election*, vol. I (Washington, DC: USDOJ, March 2019), 1, <https://www.justice.gov/>.

64. Scott Shane, “How Unwitting Americans Encountered Russian Operatives Online,” *New York Times*, February 18, 2018, <https://www.nytimes.com/>.

65. Guadagno and Guttieri, “Fake News.”

66. Parlapiano and Lee, “Propaganda Tools.”

67. Michael Martelle, ed., *Exploring the Russian Social Media Campaign in Charlottesville*, National Security Archive, The Cyber Vault Project, February 14, 2019, <https://nsarchive.gwu.edu/>.

Assessing Strategic Competition

To paraphrase Carl von Clausewitz, the most important judgment is to know the kind of war one is in.⁶⁸ United States strategy documents articulate a contest of deterrence, sustaining the international order by threat of punishment.⁶⁹ Accordingly, the Air Force has invested in technology to create ever more sophisticated and connected systems to amplify the speed, stealth, precision, and deadliness of that punishment.

By contrast, China and Russia, as challengers, seek advantages in a gray zone contest without triggering that punishment. In doing so, both have embraced the more holistic and original US conception of information warfare—both information-technical and information-psychological. Russia developed digital tools to super charge Soviet-era agitation tactics in “information confrontation.”⁷⁰ China developed an integrated cyber-information framework of informatized warfare. This broader information-warfare concept has recently experienced a revival in the American strategic conversation.

In a 2019 study, Joshua Sipper and I identified four trends fueling this revival: (1) the ubiquity of cyberspace and accompanying technologies in everyday life; (2) a maturation of capabilities including the ability to kill; (3) a recognition of the interrelatedness of information-related capabilities including electronic warfare, and cyber, intelligence, psychological, and information operations; and (4) the offensive advantage and the development of offensive cyber operations policy and doctrine.⁷¹ Are these trends sufficient to prompt innovation?

Accelerate Change

Those who study military innovation look for change, “in the goals, actual strategies, and/or structure of military organization.”⁷² A major innovation as defined by Rosen is “change in one of the primary combat arms of a service in the way it fights.”⁷³ Innovation may take the form of redefining goals, a change in the concept of operations, or even the creation, as with the US Space Force in 2019, of a new combat arm.

The Air Force has not created a cyber force, nor was it a favorable indicator when, in 2021, the Air Force dropped “cyberspace” from its mission statement. At that time,

68. Carl von Clausewitz, *On War*, 8th ed., ed. and transl. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1984), 88.

69. Joseph R. Biden Jr., *Interim National Strategic Guidance* (Washington, DC: White House, 2021).

70. Lesley Kucharski, *Russian Multi-Domain Strategy against NATO: Information Confrontation and Forward-Deployed Nuclear Weapons in Europe*, Center for Global Research, Lawrence Livermore National Laboratory, February 2018, <https://cgsr.llnl.gov/>; and Thomas Rid, *Active Measures*, 1st ed. (New York: Farrar, Straus & Giroux, 2020).

71. Karen Guttieri and Joshua Sipper, “Why It’s All about Information Warfare Now,” (paper presented at the NATO at 70 Conference, Troy University, Troy, AL, November 2019).

72. Theo Farrell and Terry Terriff, “The Sources of Military Change,” in *The Sources of Military Change*, ed. Theo Farrell and Terry Terriff (Boulder, CO: Lynne Rienner, 2002).

73. Rosen, *Next War*, 7.

the Air Force mission statement changed “Fly, fight and win . . . in air, space and cyberspace,” to “Fly, fight, and win – airpower anytime, anywhere.” This rewording eliminates cyber and space. The Air Force was returning to its “core” mission.⁷⁴ Military innovation may require change not only in operations, but in culture.

The Air Force and the United States in general did make numerous institutional changes in response to perceived changes in the security environment. But if innovations “that change the context within which war takes place” are “the most influential,” the Air Force must accelerate change in force development, preparing and promoting an officer corps to envision and execute a new way of war.⁷⁵

In 2010, the United States established Joint US Cyber Command and in 2011 recognized cyberspace as a warfighting domain alongside land, sea, air, and space.⁷⁶ That was “liberating,” wrote Michael V. Hayden, but it was significant that this domain was “a creation of man” and he wondered whether the possibilities it opened up were enough to “rethink” doctrine.⁷⁷

United States Cyber Command’s modest initial concept was to support conventional forces in crisis and sustain the ability to respond to significant attacks on US critical infrastructure. By 2012, that was no longer sufficient.⁷⁸ Cyber Command established a cyber mission force, “ready to execute a range of cost-imposing operations.”⁷⁹ Today the Air Force provides 40 percent of the 133 teams that compose this force.⁸⁰

Although the Air Force did not create a separate force for information warfare, it did create a new numbered Air Force for information warfare. In 2019, the Air Force combined the numbered Air Forces for intelligence and cyber to create the Sixteenth Air Force for information warfare. A single lieutenant general represents intelligence and cyber on the Air Staff.

74. Joshua Dewberry, “Air Force Unveils New Mission Statement,” US Air Force News (website), April 8, 2021, <https://www.af.mil/>.

75. Alan R. Millet and Williamson Murray, *Military Innovation in the Interwar Period*, 1st paperback ed. (Cambridge: Cambridge University Press, 1998), 305.

76. David Alexander, “Pentagon to Treat Cyberspace as ‘Operational Domain,’” Reuters, July 14, 2011, <https://www.reuters.com/>.

77. Michael V. Hayden, “The Future of Things ‘Cyber,’” *Strategic Studies Quarterly* 5, no. 1 (Winter 2011): 4.

78. Paul M. Nakasone, “A Cyber Force for Persistent Operations,” *Joint Force Quarterly* 92 (1st Quarter 2019): 11, <https://ndupress.ndu.edu/>.

79. *Testimony to Subcommittee on Intelligence and Emerging Threats and Capabilities, Hearing before United States Congress House of Representatives, Committee on Armed Services*, 116th Cong. (March 4, 2020) (statement of General Paul M. Nakasone, commander, US Cyber Command, and director, National Security Agency), <https://www.congress.gov/>.

80. Mark Pomerleau, “Air Force Would Contribute Bulk of New Cyber Mission Force Teams,” *DefenseNews*, July 14, 2021, <https://www.defensenews.com/>.

In 2020, Nakasone declared the top priority for US Cyber Command was to ensure the US election was “safe, secure, and legitimate.”⁸¹ A military structure focused on cyberspace protecting democracy at home would have been difficult to imagine not so long ago. Also in 2020, Cyber Command and Microsoft mutually responded to Trickbot, although the degree of coordination remains unclear. Trickbot, a botnet of over one million infected servers attributed to Russian criminals, was connected to ransomware against hospitals and threatened US systems for the 2020 election.⁸²

Cyber Command hacked into the botnet servers and replaced exposed passwords and financial data with junk data to make them useless. Microsoft obtained a federal court order and took its own servers offline in order to thwart the botnet.⁸³ Meanwhile by November 2021, Cyber Command had conducted over a dozen “hunt-forward” operations, which can be offensive in nature, and had done so in fourteen countries in recent years.⁸⁴ Teams from the United States in Ally and partner nations spot adversary operations and share the information with partners.

After returning to the drawing board on the Joint warfighting concept, Hyten noted the goal is to be “fully connected to a combat cloud that has all information that you can access at any time, any place . . . to be able to act quickly on that.”⁸⁵ He described expanded maneuver in space and time, aggregation for lethality, and disaggregation for survival with more secure, just-in-time information. It will require officers to make it so.

Developing Airmen for Information Warfare

A new way of war ascends with officers who are learning and practicing it; developing and promoting these officers is a long-term investment. Promotion matters because change agents make certain enemies and uncertain friends, therefore strong leadership is needed to shelter creative thinkers.

The US Army Air Forces in the 1940s made the argument that they did not only support other warfighters, they created strategic effects. “If talented cyberwarriors convince themselves that strategic warfare offers a better slot at top command slots, they will migrate accordingly. Perhaps if cyberwar is that important, there will be

81. Sydney J. Freedberg Jr., “2020 Elections: NSA and Cyber Leader is Confident vs. Russia” *Breaking Defense*, July 20, 2020, <https://breakingdefense.com/>.

82. Jay Greene and Ellen Nakashima, “Microsoft Seeks to Disrupt Russian Criminal Botnet It Fears Could Seek to Sow Confusion in the Presidential Election,” *Washington Post*, October 12, 2020, <https://krebsonsecurity.com/>.

83. Brian Krebs, “Microsoft Uses Trademark Law to Disrupt Trickbot Botnet,” *KrebsonSecurity* (blog), October 12, 2020, <https://krebsonsecurity.com/2020/10/>.

84. Brad D. Williams, “Cybercom Has Conducted ‘Hunt Forward’ Ops in 14 Countries, Deputy Says,” *Breaking Defense*, November 10, 2021, <https://breakingdefense.com/>.

85. David Vergun, “DOD Focuses on Aspirational Challenges in Future Warfighting,” *US Department of Defense News* (website), July 26, 2021, <https://www.defense.gov/>.

enough resources and manpower to go around.”⁸⁶ The Air Force must open paths forward for both people and ideas.

The Trickbot scenario, with legal issues and public-private operations, offers a good example of the unique complexities of information warfare. Securing US elections requires strategic integration of operational expertise and extensive coordination across and within government, military, private sector, and international partners. Thwarting terrorist propaganda online for recruiting and financing takes technical expertise plus leadership and campaign-planning skills. Without question, “recruiting, training, developing, and retaining the best talent is essential for the military to defend the Nation in cyberspace.”⁸⁷ This is the responsibility of the services, but each is already preoccupied with their respective domain.

The executive director of the bipartisan Cyberspace Solarium Commission and his coauthors argued “each of the services should be offering significant programs in cyber strategy at their war colleges.”⁸⁸ The commentary lamented that the dedicated cyber strategy programs that did exist were under constant threat of extinction.

Lieutenant General Mary O’Brien, Air Force deputy chief of staff for Intelligence, Surveillance, Reconnaissance and Cyber Effects Operations, issued an “integration imperative” of previously compartmentalized information warfare capabilities.⁸⁹ Information technology skills alone will not meet this intent. First, when new skills are associated with a technical specialty, those officers are in danger of being “relegated to professional oblivion.”⁹⁰

Second, integration implies an interdisciplinary curriculum. In addition to using technology, officers must “leverage information effectively to shape relevant actor behaviors, perceptions, and attitudes.”⁹¹ The emerging field of social cybersecurity has much to offer in complement to technical training. This field focuses on the intersection of human behavior and technology, including how cyber mediates “changes in individual, group societal, and political behaviors and outcomes.” Applied work supports “building of the cyber infrastructure needed to guard against cyber-mediated threats.”⁹² Human factors in cyberattacks—how threat actors use cyberspace to recruit and finance operations, mobilize extremists to action, and sway elections—must be analyzed.

86. Libicki, *Peace and War*, 166.

87. Nakasone, “Testimony.”

88. Erica Borghard, Mark Montgomery, and Brandon Valeriano, “The Challenge of Educating the Military on Cyber Strategy,” *War on the Rocks*, June 25, 2021, <https://warontherocks.com/>.

89. Mary F. O’Brien, *Integration Imperative: Synchronization of Information Warfare Functions* (Washington, DC: Department of the Air Force, 2021).

90. Rosen, *Next War*, 20–22.

91. O’Brien, *Integration Imperative*.

92. National Academies of Sciences, Engineering, and Medicine 2019, *A Decadal Survey of the Social and Behavioral Sciences: A Research Agenda for Advancing Intelligence Analysis* (Washington, DC: The National Academies Press, 2019), 142, <https://doi.org/>.

Commander of Air Combat Command General Mark D. Kelly observes, “while there are many Air Force and DoD programs currently available to build essential technical cyber skills, the Air Force cannot afford to passively await the development of cyber strategists by happenstance or on-the-job training of those already filling critical positions.”⁹³ Currently, force development stalls out beyond cyber hygiene, digital literacy, and IT training. For select Airmen, the service offers training in digital forensic analysis, intrusion-detection response, and other sophisticated technical skills. As important as those *cybersecurity* skills are, the Air Force also needs *cyber strategy* skills to accelerate change.

And Win

Should the Air Force fail to innovate, General Brown’s prognosis is grim: “If we don’t change—if we fail to adapt—we risk losing the certainty with which we have defended our national interests for decades. We risk losing a high-end fight. We risk losing quality Airmen, our credibility, and our ability to secure our future.”⁹⁴ Persistent engagement in cyberspace has created a new context and roles for Brown’s Air Force.

To win the information war, the Air Force will need tech-savvy leaders and strategists. These officers must be able to partner constructively with other US agencies and industry players and Ally and partner nations. The Air Force can accelerate change if it invests not only in technology but also in the leaders needed to conceive and fight this new way of war. Æ

Karen Guttieri, PhD

Dr. Guttieri is the dean of the Air Force Cyber College.

93. Mark D. Kelly, “Requirement for Air Force Cyber College Programs,” (Washington, DC: Department of the Air Force, August 2, 2021).

94. Brown, *Accelerate Change*, 2.

HAMMER AND ANVIL

COERCING RIVAL STATES, DEFEATING TERRORIST GROUPS, AND BOMBING TO WIN

ROBERT A. PAPE

The power of airpower lies in its supreme ability to match the use of force to decisive weaknesses in an opponent's military strategy. This power lies not so much in technology, the balance of forces between coercer and opponent, civil-military relations, or professional command and control over military forces, although each of these is critical to the successful use of coercive airpower that achieves vital political objectives without inflicting harm to no purpose. Effective airpower instead turns, fundamentally, on understanding the enemy.

The 1991 Gulf War—it was a stunning victory! Nearly two decades after the United States' ignominious defeat in Vietnam, America's precision-guided airpower—based on a vast array of highly accurate weapons, advanced sensors, newly deployed stealth, and other aerial platforms, unified by computerized information processing—played the decisive role in coercing Saddam Hussain and Iraq's 42 heavy combat divisions to abandon their conquest of neighboring Kuwait. From this moment, airpower would become increasingly important to American grand strategy, projecting force more rapidly and at less risk of life than landpower and more formidably than seapower, whether the opponent was a nation-state or a terrorist group.

In the 30 years since, the central debate in American military strategy has been, can airpower alone do the job? Modern advocates of strategic bombing say yes. As they see it, the first Gulf War proclaimed a revolution in military affairs that dramatically increased the effectiveness of airpower both in absolute terms and relative to other coercive instruments.

Whether carried out by manned platforms or aerial drones and whether by threatening enough pain on enemy civilians to overwhelm their interests in the dispute or decapitating an opponent's leadership, strategic bombing could bring an opponent to its knees without messy ground battles. Wars could be won by bombing just a handful of key targets, thus requiring the commitment of relatively little or no ground forces.

Skeptics say no. The ground power school argues modern airpower is hardly more effective than in the past since only ground forces can take and hold territory. Thus, victory still requires the ability to destroy the enemy ground forces on and near the contested territory, there is no revolution in military affairs, and ground power remains the dominant coercive instrument.

The two extremes in this debate ignore an important middle position. Technology may indeed reverse the traditional relationship between landpower and airpower,

such that there are circumstances when airpower can do most of the work. The critical element of airpower, however, is not strategic bombing against an opponent's political and economic centers but theater air attacks against enemy fielded forces.

While strategic bombing aims to succeed without a friendly army, theater airpower operates together with ground power like a hammer and an anvil, smashing enemy fielded forces throughout the theater of operations. In most circumstances, intense ground pressure remains essential to force the enemy to expose itself to air attack. But airpower can indeed become the dominant partner, landpower the supporting instrument, and “hammer and anvil” an effective strategy even when American theater airpower is combined with Allied and partner ground forces.¹

Hammer and anvil has been my contribution to the airpower debate. This article explains the origins of how I arrived at this view in *Bombing to Win*, which has remained required reading in numerous universities and military education programs for over twenty-five years and has been published in multiple languages. This article also summarizes the principles of coercive success outlined in *Bombing to Win* and explains how they apply to the spectrum of conflict: nonstate actors to nation-states with conventional armies to great powers with nuclear forces.

To summarize my theory, the power of airpower lies in its supreme ability to match the use of force to decisive weaknesses in an opponent's military strategy. This power lies not so much in technology, the balance of forces between coercer and opponent, civil-military relations, or professional command and control over military forces, although each of these is critical to the successful use of coercive airpower that achieves vital political objectives without inflicting harm to no purpose. Effective airpower instead turns, fundamentally, on understanding the enemy.

Grasping the genuine power of airpower is not just of historical or academic significance. Understanding the capability of airpower makes all the difference in how America should prepare to fight future wars, what strategies America should actively develop as contingency plans, in military exercises, and with our Allies and partners, and ultimately whether America will fail or succeed.

Bombing to Win

Over 30 years ago, as a young PhD student at the University of Chicago studying national security affairs, I was fascinated by a key puzzle: Why did the United States—at the time, the world's leading military, economic, and technological power—lose the Vietnam War? This was clearly not a case of being outmatched on material grounds, since the opponent was relatively tiny, poorly equipped, with little industrial capacity, much less a sophisticated technological base. Moreover, the United States had a powerful weapon—airpower—that the opponent completely lacked. Building on deterrence concepts, classification schemes of militant groups, crucial airpower histories, and

1. Robert A. Pape, *Bombing to Win: Airpower and Coercion in War* (Ithaca, NY: Cornell University Press, 1996).

crisis bargaining dynamics, the idea for *Bombing to Win* (and subsequent analysis) was born.

Bombing to Win studies the conditions under which coercive airpower succeeds and fails, analyzing every strategic air campaign by the United States and other countries from World War I through the 1991 Gulf War, 40 cases in all. The book also deeply investigates five important cases of the employment of strategic airpower—Japan, Germany, Korea, Vietnam, and Iraq. In every case, the goal was to explain whether military coercive pressure caused the target opponent to accept the political demands of the coercer and if so, the relative role of strategic airpower in the coercive success compared to other coercive military instruments (ground or naval power) that may have been employed against the target opponent.

Bombing to Win challenged accepted wisdom on when and how military coercion works, focusing on the vital role of denial—the threat of military failure. The central finding was that denial, not punishment or leadership decapitation, was the crucial logic by which coercion most often succeeds. The record also showed that strategic bombing was a marginal coercive tool. The historically most common strategic bombing strategy, punishment, is rarely, if ever, effective.

Over 100 years, the record of airpower has been replete with efforts to alter the behavior of states by attacking or threatening civilian population centers or the civilian economy, with few cases where there is even serious debate over whether punishment produced decisive effects. The more popular strategic bombing strategy in today's military and civilian circles, leadership decapitation, is also rarely effective in producing political concessions independent of the use of more effective coercive tools. Although exceptions exist, history shows that theater airpower combined with landpower is a much more powerful coercive tool than strategic bombing.

In brief, *Bombing to Win* has four fundamental principles. First, the key to successful military coercion is to recognize that all strategic actors—the strategic rival as well as the coercer—want to win, at least once they are engaged in a severe international dispute. Although undoubtedly also motivated by other factors, successful coercers should prepare, plan, and execute strategies on the premise that strategic rivals want victory more than they want national prestige, the leaders' personal power, or ideological programs for their society, because victory, once a major international dispute starts, is the ultimate means to those other ends. Assuming an opponent has nonrational strategic goals underestimates the enemy, a key source of failure in past coercive attempts.

Second, the paramount importance of victory means the key to successfully coercing the opponent is denial—reducing the enemy's probability of success in achieving the issue at stake in the international dispute (usually, taking or holding specific territory). In other words, the coercer succeeds to the extent that it thwarts the opponent's military strategy for controlling the objectives in the dispute. Once the opponent is persuaded that specific objectives cannot be achieved, it is likely to concede rather than suffer further pointless losses regardless of effort. This form of coercion, however,

is rarely cheap or easy. Even successful coercion usually takes nearly as long and costs nearly as much as fighting to a finish.

Third, in terms of concrete operational strategies, denial often means hammer and anvil, where the combined power of an airpower hammer and a ground power anvil work together to put the opponent in a military catch 22. If the enemy concentrates its ground forces in large numbers to form thick and overlapping fields of fire, they become vulnerable, and the airpower hammer can smash them to bits. But if the enemy disperses to avoid air strikes, the coercer's ground forces can defeat them in detail, mopping them up with few losses.

Finally, the growing power of hammer and anvil is the true revolution in precision airpower. Today's precision weapons have not increased the coercive effectiveness of destroying political and economic targets since it has long been possible to destroy them with large numbers of "dumb" bombs. Nor have precision weapons revolutionized the effectiveness of leadership decapitation, which has failed repeatedly against a variety of enemies, working only against a rare type of terrorist group.

Today's precision weapons allow airpower to destroy massed enemy ground troops more easily, under a variety of conditions, and to attack other smaller but still essential battlefield targets. Until the precision age, airpower could rarely destroy tanks, trucks, command posts, or bridges used to supply fielded forces with even thousands of bombs aimed at these tiny targets. Now, satellites, advanced sensors, and various manned and unmanned bombing platforms can reliably locate concentrated enemy forces for precision strikes to destroy.

Coercion across the Spectrum of Conflict

The idea that successful military coercion is a function of thwarting an opponent's military strategy has an important implication: Not all enemy military strategies will be similarly vulnerable. Hence, coercers may have tremendous power against an opponent with one type of military strategy, only to discover that their coercive power is far weaker against opponents at different points along the spectrum of conflict from nonstate actors and terrorist groups to states with conventional military forces to states with both conventional military forces and nuclear capabilities.

The variability of coercive power across the spectrum of conflict is a hard lesson for coercers to take seriously. Strategic bombing advocates often view the success of coercion as a function of advances in bombing technology, with the result that they expect the same air campaign to produce success across a wide variety of enemy military strategies. Before World War II, the US Air Corps Tactical School claimed the enemy center of gravity was the will of the civilian population and so advocated for strategic bombing campaigns to inflict massive economic punishment as a one-solution strategy regardless of the enemy.

In the 1990s, modern strategic bombing advocates asserted that precision airpower's ability to target leaders with only a few air strikes meant that America would have unprecedented global power and global reach to coerce virtually any opponent on the planet, quickly and easily. These views, however, essentially ignore the enduring prin-

ciple that enemy strategies can vary tremendously in their vulnerability to coercive military pressure.

A good example prior to the precision age is the Vietnam War. From 1965 to 1968, American airpower sought to compel North Vietnam to end its insurgency against South Vietnam, launching the massive Rolling Thunder air campaign against military and industrial targets from the Demilitarized Zone to the vicinity of the major cities of Hanoi and Haiphong, all to no avail. In 1972, however, a highly similar set of air campaigns called Linebacker I and II did produce at least a modest coercive success by bringing the North to the negotiating table and halting its military operations against the South for several years.

What made the difference? Not punishment, since the bombing killed fewer civilians and destroyed less economically in 1972 than from 1965 to 1968. Not leadership targeting, since this strategy was not employed in a meaningful way in either period. The fundamental difference was that North Vietnam changed its military strategy from guerrilla warfare, which strategic bombing could do little to undermine, to a massive conventional invasion of South Vietnam that airpower in combination with friendly South Vietnamese army forces could and did thwart.

The principles of *Bombing to Win* thus apply across the spectrum of conflict, but this application varies according to differences in the vulnerability of the opponents' military strategy.

States with Conventional Armies

Hammer and anvil works best against opponents with large conventional military forces where the issue in dispute is the control of territory. Specifically, combined power is effective when it exploits the tactics commonly used by large, mechanized armies in modern warfare, the essentials of which have not changed with the advent of precision weaponry.

Since World War II, attackers in mechanized warfare have usually tried to break through the enemy lines and then advance through the breach, deep into enemy territory. To prevent such breakthroughs, defenders typically seek to build formidable front lines so that any section that is attacked can hold out until local reserves arrive. If breakthroughs do occur, defenders use mobile reserves to counterattack the exposed flanks of the penetrating spearheads to cut them off (or at least slow them down) while a new defensive line is established. Even when today's large infantry-based armies lack the full complement of mechanized forces, they often adopt similar tactics in strategies to take and hold territory.

Airpower plays a vital role in this situation. It is a powerful offensive tool that can thwart defensive strategies in two ways. Airpower can help a friendly ground attacker weaken the enemy's front line by attacking it directly or blocking its access to supplies and possible reinforcements. More critical, airpower can also assist penetrating spearheads after a breakthrough by stopping the movement of enemy reserves deeper behind the front and preventing them from redeploying or concentrating against the attackers. Combining air and ground power has been a remarkably winning strategy

in the precision age. It has played a crucial role in America's spectacular victories over opponents with mechanized and unmechanized conventional ground forces.

In Iraq in 1991, Saddam Hussein's critical mistake was underestimating the ability of US precision airpower to thwart Iraq's military strategy to inflict heavy costs on the Coalition's impending ground offensive. Over six weeks, Coalition airpower launched air strikes that directly killed over 30,000 Iraqi troops and convinced another 100,000 to desert, attriting infantry by about a third and creating huge holes in their front lines, making it impossible for the Iraqis to stop a breakthrough at the front. Airpower also destroyed 2,500 pieces of heavy equipment behind the front lines and prevented Iraq's mobile reserves from concentrating in significant numbers inside the theater, which kept them from filling the gaps in the front lines or blocking coalition ground forces that penetrated their lines.

In Bosnia in 1995, the combination of airpower and ground power also had a potent effect in ending Bosnia's three-year civil war. Although not a single bomb fell on Belgrade during this conflict, US theater airpower pounded Bosnian Serb battlefield command posts, military units, and supply bridges, while 100,000 Croat and Bosnian Muslim ground forces attacked the 50,000 troops of the Bosnian Serb army, coercive pressure that brought Slobodan Milosevic and other Serbian leaders to the bargaining table and determined the boundaries of the final map negotiated at Dayton.

The US air operation Deliberate Force was a critical complement to forces on the ground, largely because it bombed military targets in Bosnia and hindered the Bosnian Serb army's ability to counter-concentrate against the oncoming Muslim-Croat ground offensive. For the first time in history, the hammer-and-anvil strategy used US precision airpower working alongside local ground forces.

In Kosovo in 1999, Milosevic surrendered control of the province to NATO. While this is the one case over the past 100 years when punishing civilians may have had a coercive effect, the most persuasive explanation was NATO's threat to invade Kosovo by using airpower and ground forces simultaneously. NATO bombs killed about 500 Serb civilians and damaged Serbian economic infrastructure—a modest toll by historical standards and the rate of attacks against new strategic targets was sharply declining, especially in the weeks after NATO embarrassed itself by bombing the Chinese embassy in Belgrade. The more likely explanation is that Milosevic surrendered from fear that NATO would invade Kosovo with the devastating help of precision airpower.

On June 8, Former Russian Prime Minister Viktor Chernomyrdin met with the Serbian leader, summarizing his remarks in a press conference: "If the current peace plan for a settlement in Kosovo is not carried out . . . NATO has a plan for carrying out a ground operation."² NATO took strong measures to make that threat credible, widening supply roads in Albania, deploying over 35,000 combat troops on Kosovo's

2. Robert A. Pape, "The True Worth of Air Power," *Foreign Affairs* (March/April 2004): 125, <https://www.foreignaffairs.com/>.

borders, and calling up tens of thousands of ground-force reserves. Theater airpower combined with the threat of a ground offensive most likely won Kosovo.

In 2001 in Afghanistan, the United States successfully toppled the Taliban government by imitating and updating the strategy it had tested in Bosnia, combining precision airpower with ground attacks by local troops. Once again, hammer and anvil was devastating, but not before a failed effort at leadership decapitation occurred. The first month of bombing, in October 2001, targeted command and control locations of the Taliban's most senior leadership. These strikes failed to kill Mullah Omar or other top leaders.

As a result, in early November, US special operations forces began coordinating air strikes to support Northern Alliance assaults on the Taliban's approximately 25,000 troops in northern Afghanistan, most of which were concentrated in front lines. The Taliban's front lines collapsed within days of air strikes against their infantry, opening avenues for the Northern Alliance to quickly overrun major strategic points and the capital city, Kabul. Again, thwarting the opponent's capacity to concentrate ground forces proved to be the key to success.

In Iraq in 2003, the United States conquered Baghdad and vast portions of Iraq within about six weeks in another stunning military victory. Although the war started with a three-day effort to "shock and awe" the Iraqi leadership into surrendering without a fight, this promptly failed, and airpower soon shifted to Iraq's Republican Guard and other conventional army units that Saddam had deployed along the key approaches to Baghdad, hoping to create a protracted battle of attrition for the capital.³

Caught in a lose-lose choice between facing air strikes or ground strikes, most Iraqi troops abandoned their positions. As Brigadier General Allen Peck, USAF, a key member of the air command center, said: "Ground troops forced the enemy's hand. If they massed, airpower could kill them. If they scattered, they would get cut through by the ground forces."⁴ The hammer-and-anvil strategy succeeded once again against an opponent with a conventional army strategy.

Nonstate Actors

The principles of *Bombing to Win* also apply to terrorist groups, local militias, and other kinds of nonstate actors, but with an important caveat: Sometimes leaders matter decisively to nonstate actors, with the result that sometimes leadership decapitation can be effective, while at other times only hammer and anvil offers an effective strategy.

In the years after the 9/11 terrorist attacks, I focused much of my research efforts on explaining the root causes of suicide terrorism.⁵ This research also caused me to

3. Stephen T. Hosmer, *Why the Iraqi Resistance to the Coalition Invasion Was So Weak* (Santa Monica, CA: RAND Corporation, 2007), <https://www.rand.org/>.

4. Pape, "Worth of Air Power," 128.

5. Robert A. Pape, *Dying to Win: The Strategic Logic of Suicide Terrorism* (New York: Random House, 2005); and Pape and James K. Feldman, *Cutting the Fuse: The Explosion of Global Suicide Terrorism & How to Stop It* (Chicago: University of Chicago Press, 2010).

think more extensively about the conditions under which airpower and other coercive instruments could succeed against militant nonstate actors, a subject that I did not focus heavily on in my previous work on airpower, since states have historically been far and away the main targets of military coercion.

In *Dying to Win* (2005) as part of an offshore balancing counterterrorism campaign, I recommended strikes against Al Qaeda's leadership in Pakistan, since it was clear this group lacked much local support in the country and, therefore, aerial attrition could be an effective strategy against the group. In *Cutting the Fuse* (2010), my coauthor and I coined the term "over-the-horizon" to explain the offshore balancing concept more fully and recommended using US airpower combined with local ground Allied and partner forces as our most effective approach against other anti-American terrorist groups in the Middle East and Africa. In January 2015, coauthors and I advocated for the hammer and anvil strategy against ISIS in Iraq and Syria.⁶

As against state opponents, the airpower strategies most likely to be effective against nonstate actors depend on the characteristics and strategy of the opponent. Overall, nonstate actors vary considerably in their degree of dependence on leadership, support from the local community, and the nature of their military operations. Perhaps most important, the cohesion and membership of militant groups are sometimes heavily dependent on the support of preexisting social groups found in the local area of their operations, while at other times, they are instead dependent on idiosyncratic loyalties to specific leaders.

Further, nonstate actors also vary considerably in their commitment to territorial control. As Mao Zedong famously articulated, militant groups often pass through a series of operational phases, from guerrilla warfare with few or no meaningful territorial bases, to quasi-conventional light infantry operations to take and hold strategically valuable territory and population centers, to ultimate victory over the state by large-scale conventional war strategies.

Given the variation in their dependence on community support and commitment to territorial control, coercion is likely to be harder against nonstate actors than states with conventional armies, and coercers should expect to pay the full costs of military success to extract political concessions against militant groups. Hence defeat, not coercion, will often be the viable aim against nonstate actors.

From the perspective of airpower, there are three types of militant groups. The first type is a vanguard group with little or no sources of local community support and whose cohesion is primarily a function of loyalty to specific leaders. The second type is a socially embedded group comprised mainly of local leaders and fighters using quasi-conventional ground forces to actively defend and gain territory. The third type is comprised of socially embedded groups waging guerrilla operations independent of territorial control. These three categories of militant groups are important because each type is vulnerable to a different air strategy.

6. Robert A. Pape, Keven Ruby, and Vincent Bauer, "Hammer and Anvil: How to Defeat ISIS," *Foreign Affairs* (January 2015), <https://www.foreignaffairs.com/>.

No Local Support

Against vanguard groups, leadership decapitation and aerial attrition can significantly damage and degrade, if not defeat, the group. Since these groups lack deep local community support, they have great difficulty replenishing losses in their ranks at every level. The main problem for the attacking state is gathering accurate intelligence about the identity of members of targeted groups and their presence at specific locations and times. Such intelligence often requires patience, since accurate, real-time information commonly comes from unpredictable human intelligence successes, similarly unpredictable operational security failures by the opponent, and restraint, since attacking wrong targets and inflicting collateral damage against local bystanders is strategically counterproductive.

Al Qaeda Central is an example of effective leadership decapitation and aerial attrition against a vanguard group. After the fall of the Taliban in 2001, Osama bin Laden, other Al Qaeda leaders, and hundreds of Al Qaeda cadre—most from the Middle East and few from Pakistan or Afghanistan—fled Afghanistan and established operations in Pakistan.

For years, the group continued inspiring and directing attacks against Westerners in Bali, Madrid, London, and numerous other places. Consistent with recommendations in *Dying to Win*, the United States pursued a policy of selective air strikes. Over time, this military pressure culminated in the successful special forces raid that killed bin Laden in Abbottabad, Pakistan in March 2011, gradually wore down the group's core leaders and cadre, and rendered Al Qaeda a shadow remnant of the original group. Al Qaeda has not launched a major terrorist attack against the West in over a decade.

Socially Embedded with Local Leaders and Fighters

Hammer-and-anvil strategies can be effective against socially embedded militant groups committed to controlling territory. These groups have the greatest potential for mass recruitment provided they can control strategically vital territory and relevant population centers, usually with quasi-conventional forces.

When they reach this point, they become essentially nascent nation-states, unlikely vulnerable to leadership decapitation and aerial attrition because they can easily replace lost leaders and fighters but are vulnerable to hammer-and-anvil strategies because their operations depend on concentrating ground forces to control territory. The United States is strategically better off by working with a local ground-power ally, since this avoids the “occupier’s dilemma” of using foreign combat forces that stimulate more terrorists than it prevents.⁷ Hence, success against socially embedded groups

7. Pape and Feldman, *Cutting the Fuse*; Robert A. Pape, principal investigator, *Final Integrated Theory of Over-the-Horizon Counterterrorism and Suicide Attack Organization Response*, Technical Report #7 ONRBAA15-001 (Washington, DC: Office of Naval Research, August 25, 2017); and Pape, “Don’t Overestimate Drone Strikes’ Power to Kill High Value Targets,” Cipher Brief, September 10, 2017, <https://www.thecipherbrief.com/>.

turns critically on whether a viable local ground power ally exists that is in fact willing to fight and die to wrest control of territory away from the militant group.

The defeat of Islamic State in Iraq and Syria as a territorial entity is an example of an effective hammer-and-local-anvil strategy against a socially embedded group committed to controlling territory. In June 2014, ISIS took control of Mosul and other population centers in a vast area of Iraq and Syria that the group declared as its Caliphate. In August, the United States responded by launching an air campaign that blunted further territorial expansion by ISIS, particularly the group's ground attacks against the oil-rich regions of Iraq.

In early 2015, the air campaign evolved into a hammer-and-local-anvil strategy. Over the next several years, both the Obama and Trump administrations executed this strategy, providing close air support allowing the Iraqi army, Kurdish, and other Sunni groups to rollback ISIS areas of control in Iraq and eastern Syria and tacitly coordinating with Syrian government ground forces to finish off ISIS as a territorial entity by early 2018.

The Afghan Taliban seizure of control of Afghanistan in 2021 shows how airpower and enormous commitment of militant and economic resources can fail when an effective ground power anvil is not available. Despite a twenty-year commitment, installing a Western-style government in 2004, transferring over a trillion dollars of economic and military assistance to the Afghan government and security forces, and a major employment of airpower, the United States was unable to stop the increasing Taliban offensive to control territory.

For years, the Taliban's territorial control had been gaining momentum, as the group increasingly absorbed non-Pashtun as well as Pashtun areas of the country, a rising tide that culminated in the sweeping wave of Taliban victories over nearly the entire country during the spring and summer of 2021.

Although complete information about the tactics the United States employed there is still unavailable, it appears the crucial failure was the inability to find or create a viable local ground power ally that would coordinate with American airpower but still fight mainly on its own. Indeed, in the spring and summer of 2021, the Afghan security forces were not so much beaten in pitched battles; they merely deserted en masse rather than confront the enemy. The lesson is clear: hammer and anvil cannot work if the ground power anvil is unwilling to come to the fight.

Socially Embedded Guerillas

In the case of socially embedded groups waging guerrilla operations—no meaningful concentration of ground forces, miniscule logistic requirements, and little time-sensitive communication across integrated command and control networks—airpower is most effectively used directly against guerrillas. But the ability of airpower to substitute for ground power is significantly constrained by tremendous difficulties in identifying friend from foe from the air, which can be offset only partially by increasing loiter time over the target and coordination between air and ground units. These severe limitations on airpower against guerrillas help to explain why so many “search

and destroy” campaigns fail against scattered militant groups who employ mostly hit-and-run tactics.

States with Nuclear Weapons

As *Bombing to Win* explains, coercion is possible against states armed with nuclear weapons but with an important stipulation: because of their unparalleled destructive power, nuclear weapons will cast a strong shadow over the prospects for coercion. Once a crisis starts between adversary states that both have nuclear weapons—as will happen whenever the United States, which has nuclear weapons, becomes embroiled in a serious military dispute with a state with nuclear weapons—national leaders on both sides will quickly focus on the risk of nuclear escalation.

Manipulating the risk of escalation to the use of heavy punishment, which is not effective in conventional disputes, can be successful in nuclear disputes. Since the destructive power of nuclear weapons magnifies the risks, the coercer can threaten beyond levels that any state can accept, perfect credibility is not required, and even the mere possibility of nuclear escalation can generate pressure to make concessions. In this context, denial of military power matters, not because it shifts battlefield outcomes, but as another source generating risk of escalation.

In practice, manipulating the risk of escalation means relying on conventional tripwires in the early stages of a crisis. An effective tripwire deploys sufficient force to define the meaningful territorial boundary in the dispute and turn any combat over that boundary into a protracted war of attrition, denying the challenger the prospect of a quick and decisive victory to change the territorial status quo, and so compelling the opponent to fear that the conventional conflict could escalate to the nuclear level.

Since both sides would have the same fear, the logic of coercion when states possess nuclear weapons implies that nuclear coercion efforts will be rare and, when they do occur, the outcome will be determined by the balance of interests—which is often to return to the status quo.

Thus far, every coercive episode involving nuclear-armed adversaries—the end of the Korean War, Cuban Missile Crisis, other Cold War disputes, and crises involving India and Pakistan, the United States and China (Taiwan 1996), and the United States and Russia (Crimea in 2014)—have all been settled without a major conventional war. These episodes have been settled with rarely even a skirmish and at territorial boundaries that reflect either the status quo ante or new military boundaries following a rapid fait accompli by one adversary, effectively using a mobile tripwire to limit gains without engaging the other adversary’s conventional forces.

This logic and evidence have important implications for America’s challenges with Russia and China, adversaries who both have formidable nuclear capabilities. Despite shifting aggregate economic and military power balances, a conventional war of protracted attrition among today’s great powers is exceedingly unlikely in the coming decades so long as they retain assured nuclear retaliatory capabilities.

To be sure, as great powers gain relative power, they will seek adjustments in the international order that reflect their new states. Just as surely, as today’s leading great

power, the United States will have incentives to resist those changes. And the future will surely involve regional crises, just as we have witnessed regional crises over Taiwan, Ukraine, and the South China sea. In times past, such pressures have indeed led to great power wars.

Today's era of great power politics, however, has an overwhelming source of stability: the inevitable shadow of nuclear escalation that will be cast over any major crisis. Since no great power adversary can be completely sure how the other will react, both are compelled by the logic of the situation to contemplate in the early stages of any major crisis how conventional operations can lead to inadvertent, domestic political, and even deliberate pressures that lead to the use of nuclear weapons.

As a result, the certainly horrible consequences of nuclear escalation and the dangerously uncertain consequences of conventional war combine to generate enormous pressure on great power adversaries to prevent their conventional forces from engaging in serious combat. What will matter most in future coercive episodes among great powers is not the exact balance of forces but the balance of interests in how the dispute is resolved, a balance likely to compel both sides to settle the quarrel before their conventional forces do battle.

From the Napoleonic Wars to World War II, great powers have aggressively pursued regional ambitions that led to numerous great power wars. Since the coming of nuclear weapons in World War II, how many of the multitude of regional crises involving nuclear-armed great power adversaries have escalated to a conventional hot war? In this over 75-year period, the number of great power wars is precisely zero. The coming of nuclear weapons changed the nature of great power politics, the nature of military coercion, and, accordingly, the logic of *bombing to win*.

The Future of *Bombing to Win*

In the coming years, airpower is destined to be at the heart of US international security strategy, and so our decisions about how to effectively employ this powerful instrument will take on greater weight than in the recent past. Just since 2020, America has seen domestic crises related to the COVID-19 pandemic, a wobbling economy, and political violence on both the right and the left that would stress even the most robust great power. America's domestic challenges may encourage international rivals—state and nonstate actors alike—to probe opportunities to make gains, while at the same time discourage American leaders from making major commitments of ground forces to meet potentially rising security needs.

Today's generation of military and civilian leaders will, thus, face demanding decisions about the use of airpower. Essential for America's success is understanding that airpower must be matched to critical weaknesses in an opponent's military strategy. Æ

Robert A. Pape, PhD

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WINNING A PEER WAR

JOHN A. WARDEN III

A war with a peer is very unlikely to start tomorrow. If it did, however, the United States would be forced to fight with the ideas and the equipment that currently exist. America might in the final analysis prevail, but the challenge would be extreme and the cost likely to be high before victory was attained. On the other hand, if the war does not start for a decade or more, the United States has the opportunity to prepare well to win at an affordable price in a reasonable period of time. America's survival, and that of the West writ large, demands we find the solutions that will lead to victory in a war with a peer opponent. The United States cannot afford to gamble that there will not be a serious peer war in a foreseeable future.

Since the dawn of history, military organizations have tended to fight current wars consistent with the last war in which they participated. Although militaries are frequently criticized for this type of behavior, it is quite common in virtually every profession. This tendency is especially pernicious, however, when it is applied to militaries upon whose successes frequently lie the survival of their nations.

For the last quarter of a century, the United States has been participating in the small wars of the Persian Gulf and the Middle East. Although these wars have been challenging at an individual level and certainly expensive for the country, they are dramatically different from the kinds of wars that take place between peer nations. This article defines a peer opponent as one that has the capability to match the United States in the majority of potential applications of combat power ranging from basic infantry to the most sophisticated air and space warfare.

Most importantly, however, a peer opponent has the capability to attack into its enemy's strategic base including attacks on infrastructure such as electrical power, communications, and manufacturing. In World War II, the United States fought against great power opponents who were very capable at tactical and operational levels but had only a marginal ability to strike into America's strategic depths. Their attacks had little impact on American war preparations.

Conversely, barely a year after declaring war, the United States began to bring Germany under severe strategic attack and in just over two years did the same to Japan. These attacks had an overwhelming impact on the very survivability of both nations as well as on their ability to conduct war against the United States.

Since the 1990s, the United States has had the luxury of conducting operations at its own pace with historically low losses. Most importantly, America has also had almost complete security from any kind of an attack on its strategic centers of gravity. To date, US forces have been able to operate with impunity in the air over opponents. At sea the United States remains unchallenged. On the ground, the United States faced determined opponents who, on an individual basis were quite capable, but on a unit basis were simply no match for our ground forces.

So going back to the observation about how militaries (and nations) tend to fight the last war, it is conceivable the United States would be unprepared mentally and technically to take on a peer opponent. It is easy to think America is so adaptable that it can quickly shift into a different form of warfare against a different opponent. At tactical levels this may be true, but on a higher strategic level, it is certain to be extraordinarily difficult at best.

A war with a peer is very unlikely to start tomorrow. If it did, however, the United States would be forced to fight with the ideas and the equipment that currently exist. America might in the final analysis prevail, but the challenge would be extreme and the cost likely to be high before victory was attained. On the other hand, if the war does not start for a decade or more, which seems more likely, the United States has the opportunity to prepare well to win at an affordable price in a reasonable period of time. Although the timeframe before the outbreak of a serious war is uncertain, the chances the United States finds itself in a war with a peer are high enough that the United States and its military must undertake serious preparations for what is bound to be a very dangerous conflict.

America's survival and that of the West writ large demand we find the solutions that will lead to victory in a war with a peer opponent. America must not forget: if the United States loses a war against a peer, the whole country and our way of life are in jeopardy. In other words, the United States cannot afford to gamble that there will not be a serious peer war in a foreseeable future.

War Planning Methodology

What does it take to win a war? Good weaponry and employment tactics are important. In fact, the United States has excelled in this regard in virtually all its conflicts since the Korean war. That tactical excellence, however, has not made the outcome of all those conflicts satisfactory or better for the country—which has been the historical norm for millennia.

Neither tactical superiority, better weapons, nor larger forces are well correlated with victory. Of all the things a country or an organization can do to give itself the best chance of victory, getting strategy right is the most important. If the strategy is roughly right, the chance of success is excellent. Conversely, in the absence of strategy, good weapons, good tactics, and big battalions are unlikely to bring victory. Unfortunately, the most senior people in military, politics, and business tend to go directly to tactical solutions when a problem arises. More than anything else, this omission has led to poor to disastrous outcomes in most US wars from Korea to the present day.

In the wars the United States has fought since and including Korea, the nation could tolerate unsatisfactory outcomes, however distasteful. This will not be the case if America ends up in war with a peer enemy; thus, focusing on war planning methodology and especially on strategy development and execution are absolutely essential. The US military has a variety of methodologies to develop tactical plans, and many of these work well to solve tactical issues. The military does not, however, have an accepted and practiced methodology for developing strategy.

All strategy should begin with a clearly defined statement of what America wants its opponent and itself to be at the end of the military conflict. I like to think of this as a “future picture,” a term meant to suggest something very concrete and real as opposed to an intention, objective, or goal. It should describe clearly the condition of both sides that would represent unequivocal success.

This picture must be high resolution—not a platitude such as the Wilsonian World War I “making the world safe for democracy.” This future picture must also be given sufficient thought to reduce or eliminate choosing war termination conditions for both about which the United States would not be happy. The end point should never be merely defeating or destroying the opponent’s armed forces, although doing so may occasionally be a necessary means to an end; such a goal should rarely, if ever, be an end in itself despite the siren call of its alluring simplicity.

After developing the future picture, the next step involves conceptualizing the United States and the enemy as a system to locate the entities on both sides against which effort must be committed. Failure to address this area from the highest to the lowest levels of command is another common failure manifested in a leap from a generally vague (or absent) future picture to a tactical solution. Thus, in the Johnson administration, the response to slow or no progress on the ground in Vietnam was to send more troops even if it was unclear what, if anything, that might have accomplished.

In the planning of the Persian Gulf War (Operation Desert Storm), the US military called the internal and external entities “centers of gravity.” To realize the future picture, it was necessary to change Iraq as a system. The United States would accomplish this objective by attacking strategic and operational centers of gravity. This step necessarily precedes the selection of attack platforms and weapons—one determines the centers of gravity that need to be attacked, determines what needs to happen to them and when it needs to happen, and only then decides attack methodologies and weapons.

Depending on the center of gravity and the desired effect determined for it, the attack methodology could range from special forces teams to stealth bombers to space-based lasers to cyber weapons. This sequence is key to building a coherent and integrated campaign or campaigns to realize the future picture. It also provides an excellent tool for force and logistics planning because the nature and number of centers of gravity are generally discernible well in advance of conflict. To work, however, the planning requires participation and approval at the very highest level of command, including the president. Strategy is not something that should be delegated!

Time is the third element of strategy: When does the United States intend to realize its future picture? This, in turn, is based on answering the strategic question, how

much time do we have to win, not the tactical question, how long will it take? Certainly, one of the many strategic errors of our recent wars was the lack of a time element, which allowed the planning and the execution alike to be meandering and unmeasurable and resulted in lack of commander and planner accountability from the president down.

The last necessary element of strategy is determining the conditions and the method for exiting a war whether it has been successful or not. All wars end; it is the job of the strategist to ensure that the end game is carefully planned. The only good time to make end-game plans is before the conflict begins, for once it does, emotion rapidly takes hold and irrational decisions or lack of decisions become common.

America's recent record of strategic thinking and planning has been abysmal. Fortunately, however, the nature of US wars and opponents in the last three quarters of a century gave the country the latitude to muddle along without success at a price it was able and willing to tolerate. The United States will not have that luxury in a war with a peer competitor. If America intends to succeed in the future, it must resolve to learn, practice, and inculcate a strategic war planning methodology which addresses all the elements of strategy and provides the best possible probability of victory.

Strategic Principles to Follow

A real strategic principle is one which has general validity in most circumstances. Two of the most important strategic principles to understand and inculcate are *parallel war* and *strategic paralysis*.

Parallel war is a concept that flies in the face of several hoary principles of war, but its validity became clear in the Persian Gulf War. Parallel war is striking enough key targets (centers of gravity) in a time period sufficiently compressed to preclude the ability to repair or react effectively. Doing so prevents the attacked system from functioning at the level required to defend itself or to conduct offensives.

At a macro level, the two basic approaches to attacking enemy centers of gravity are to attack serially or attack in parallel. Serial attack has been the historical norm and is the basis for much current military (and business) thinking. Serial attack commences one step at a time, and success is needed to move onto the next step. Given nearly unlimited time and resources, the linear approach may work, but while the first move is taking place, the attacked opponent is responding either defensively or offensively. This process quickly devolves into brutal force-on-force attrition warfare where the outcome is hard to predict—other than that it will be very expensive and time consuming for both sides.

The other side of the spectrum is parallel warfare in which many enemy centers of gravity are brought under near simultaneous attack in a compressed timeframe. Parallel attack, adequately conceived and executed, leads to strategic and operational paralysis, makes effective enemy response difficult to impossible, dramatically reduces the cost in blood and treasure—to both sides—and enables short conflicts.

Execution of decisive parallel operations depends on the ability to strike many centers of gravity that are potentially widely separated, in a relatively short period of time.

The ability to do so is clearly enhanced by having sufficient attack mechanisms to neutralize the requisite centers of gravity. Fast, survivable, and precise attack mechanisms are powerful enablers of parallel operations.

Parallel attack is so difficult to defend against that if one side makes a successful parallel attack, the war is probably decided in that side's favor. It is imperative the United States thoroughly understands the concept of parallel operations, that it develops the capability to use it offensively, and that it takes steps to reduce its own vulnerabilities. In doing so, America will have the potential to impose strategic and operational paralysis on its opponents while working to ensure the nation does not suffer this debilitating (if not fatal) affliction.

Strategic paralysis is most easily induced with parallel operations. In essence, strategic paralysis is a condition wherein a nation or military has experienced enough degradation in key processes (command, communication, mobility) in a short enough time period that it is not capable of doing anything the opponent does not want it to do including reacting effectively to conduct counterattacks or mounting useful defenses.

This may happen (as it did to Iraq in the Persian Gulf War) with nothing remotely like the area damage inflicted by aerial attack on Germany and Japan in World War II. With current technology, we can achieve effective mass without large numbers—mass without massing. In addition, the strategic paralysis suffered by Iraq happened before the widespread availability of offensive cyber weapons that can exploit weaknesses in highly connected societies such as the United States. Imagine the results in the United States and its major cities if they were attacked as was Iraq in 1991: surprisingly few centers of gravity were neutralized in hours and in parallel, leading to rapid and irreversible strategic paralysis.

A counterattack response to a parallel attack is paradoxically far more challenging than responding to the kind of nuclear attacks envisioned in the Cold War that simply needed authorization to execute preplanned operations against preplanned targets by redundant preplanned forces. Clearly the United States cannot afford to be the victim of strategic paralysis.

Strategic Defense

Strategic defense, that is general defense of the United States itself, began to fade after intercontinental ballistic missiles proliferated on both sides of the Cold War. Over the course of these decades, the United States effectively adopted the concept of mutually assured destruction, which suggested that any kind of defense increased the chances of war. Despite a brief resurgence of interest and activity in connection with President Ronald Reagan's Strategic Defense Initiative (colloquially known as "Star Wars") and subsequent establishment of a capability to deal with a small ballistic missile attack, the country has devoted few resources to improving strategic defense capability, including that of civil defense.

Why should the United States now revive the concept of strategic defense and devote significant resources to it? The answer is simple: America has a potential enemy

that has, or will have in the foreseeable future, a capability and an apparent willingness to attack into the nation's strategic depths. This reality should be sufficient to make developing defenses a matter of priority. In addition, future peer competitors might not be as deterrable as the former Soviet Union was believed to be.

Assuming the opponent strikes first and the United States is unwilling, or perhaps even unable, to act preemptively, the highest requirement is to ensure the opponent cannot affect enough centers of gravity in a short enough period to drive the country into strategic paralysis. If that happens, the ability to continue resistance is nil. To prevent strategic paralysis, the United States must ensure a basic set of centers of gravity remains adequately functional.

These critical centers of gravity include: key national leaders, command centers (civil and military), civil and military national communications (telephone, satellite, internet, financial data, television, radio), electricity, energy distribution (oil and gas pipelines), national surface and air mobility (key bridges and airfields), and offensive capabilities. These centers of gravity must remain sufficiently functional for long enough for the country to conduct strategic counterattacks to impose paralysis on the opponent. The required duration will largely be a function of the quality of advanced planning and preparation. Of course while all this is happening, civil and military authorities must find ways to give the civilian population as much protection as possible to include air raid shelter, emergency rations, and perhaps even evacuations.

After identifying the centers of gravity to defend, determining the types of weapons or tools required for sufficient defense can begin. Broad vulnerabilities and the need for near-instant reaction suggest using space-based systems such as those that were under development for the Strategic Defense Initiative. Most, if not all centers of gravity may be vulnerable to cyberattack. Cyber defenses, therefore, are a necessity, which probably include firewall-type defense and rapidly deployable cyber counterattack weapons. The US military needs also to consider the types of enemy attack platforms that may be employed, although leaders and planners need to be very careful not to limit their thinking to current operating systems.

The platforms that might be used against our strategic depths include intercontinental ballistic missiles, short- to medium-range ballistic missiles launched from sea or air vessels; cruise missiles (and unmanned aerial vehicles) launched from a variety of locations including the immediate vicinity of targets; space-based weapons that can attack the surface with beams or kinetics; electromagnetic pulse weapons from a variety of platforms; long-range aircraft (or short- or medium-range aircraft based surreptitiously in adjacent territories), and native or inserted saboteurs. The US military must also develop and field as many different types of defenses as possible to complicate the enemy's choice of attack platforms.

Although the United States can certainly improve its strategic defenses, the best defense will ultimately remain a good offense.

Strategic Offense

Strategic offense is necessary for victory—at best, defense simply buys time and makes the enemy attack more costly. As in defense, the choice of strategic offense depends on the enemy centers of gravity that must be destroyed in order to induce strategic paralysis and on the attack time required for results. The enemy centers of gravity that must be neutralized will be like those the United States needs to defend, but their relative importance may vary somewhat as a function of the enemy's type of government and how centrally these nodes are linked.

There is no good way to know in advance how much time can be allowed to impose strategic paralysis, but the presumption must be that it is very short. That, in turn, gives planners some ideas about how quickly US forces must be able to reach and neutralize enemy centers of gravity. The following criteria provide a starting point:

- Impose strategic paralysis within 48 hours of initial enemy attack.
- Be capable of making first attacks on the enemy's strategic depths within minutes to hours of attack decision.
- Ensure attack platforms are numerous and survivable enough to neutralize enemy centers of gravity that number about the same as those of the United States.
- Base multiple attack platforms on multiple modalities such as low visibility, velocity, and standoff distance to improve the chances of successful attack and greatly complicate enemy defensive preparation.
- Ensure no single-point failure nodes that would affect the success of the attack force, such as universal dependence on global positioning satellites (GPS).
- Strive to have multiple revolutionary capabilities that are fielded quickly enough to thoroughly confound enemy force development.

Properly managed, developing a force with these capabilities need not be overly expensive. In any event, if the United States can choose to spend trillions of dollars for clearly optional social programs or deal with hypothetical problems a century in the future, the country can certainly choose to spend similar sums when the fate of the nation is at stake. In addition to force structure for defense and offense, command arrangements suitable for dealing with a peer competitor are essential. Moreover, the composition, culture, and character of the force must be up to the severe challenges posed by such a conflict.

Strategic Command

The command arrangements of today were not designed for the threat the country currently faces in that they neither equip the president adequately nor do they provide the responsiveness and flexibility needed to engage in a peer-competitor war. Under the Constitution of the United States, the president is the commander in chief of the

armed forces and thus has ultimate responsibility and authority for war decisions. To be effective in this role requires the president receive a range of military advice.

Before and during World War II, President Franklin D. Roosevelt had independent military advice from each of the service chiefs (including the chief of the Army Air Forces) and Admiral William Leahy, who served as the president's personal chief of staff. Each one of these officers had direct and independent access to the president who frequently received highly divergent views and recommendations from each of them. This divergence was exactly what any good leader, and especially the president of the United States, should demand and have as a matter of course.

As stated on the website of the chairman of the Joint Chiefs of Staff,

The Goldwater-Nichols DOD Reorganization Act of 1986 identifies the Chairman of the Joint Chiefs of Staff as the senior ranking member of the Armed Forces. As such, the Chairman of the Joint Chiefs of Staff is the principal military adviser to the President. He may seek the advice of and consult with the other JCS members and combatant commanders. When he presents his advice, he presents the range of advice and opinions he has received, along with any individual comments of the other JCS members.¹

With these guidelines, it is highly unlikely a future president will hear a full range of ideas or the strongly held position of one dissident eloquently and passionately presented—as happened with some regularity the last time the country mobilized as a nation against highly capable enemies. This guidance does not even require the chairman to consult anyone else—“he may seek,” not “he must seek.”

The second issue that seriously compromises the ability to fight and win a war with a peer competitor is the disposition and command of American air, sea, and land forces. Although commanders and planners cannot know the details of a future peer war, they can reasonably assume it will be fast, violent, and deadly, requiring a quick-reaction concentration of forces deployed to a variety of places around the globe. Accomplishing this task requires a central authority that can plan and direct forces on a moment's notice without consultation or coordination with subordinate commanders. And yet we now have an organization that is the opposite of what is needed.

Again, citing the chairman's website:

Under the DOD Reorganization Act, the Secretaries of the Military Departments assign all forces to combatant commands except those assigned to carry out the mission of the Services. . . . The chain of command to these combatant commands runs from the President to the Secretary of Defense directly to the commander of the combatant command. The Chairman of the Joint Chiefs of Staff may transmit communications to the commanders of the combatant commands from the President and Secretary of Defense but does not exercise military command over any combatant forces.²

In other words, no central competent authority has the responsibility and accountability for planning and committing forces as needed. The US military has been able

1. Chairman of the Joint Chiefs of Staff (CJCS), “About,” CJCS (website), accessed December 30, 2021, <https://www.jcs.mil/About/The-Joint-Staff/Chairman/>.

2. CJCS, “About.”

to live with this arrangement for decades in large part because the system was never severely stressed. This will not be the case in the future.

Two serious challenges must be resolved: The president must hear all the options, and the US military must be able to develop the ability to plan and commit forces rapidly and globally without bureaucratic constraints. The solutions to these problems are clear, namely, (1) enable the service chiefs' free right of access to the president without the permission or attendance of the chairman or secretary of defense, and (2) place all US forces under a central authority so they can be dispatched rapidly and freely in peace or in war. There may be other, better solutions, but they must be based on preparing the United States to plan and execute a war with a peer competitor.

While the United States is solving the current command problems, another question arises: Is the country doing everything necessary to ensure people who constitute US forces are ready and capable of winning a war that is well outside their personal experience?

The People of the Force

The composition, culture, and character of the people manning the force at the time of a war with a peer competitor will have a significant impact on the outcome of the conflict. War with a peer competitor will be incredibly dangerous and unlike anything with which the United States has any relevant experience. Because the conflict will be so different and winning an absolute necessity, the United States should build a force designed explicitly to win a peer war. Creating such a force will require selective recruiting, focused education at all career levels from entry to retirement, and a renewed emphasis on character and ethics. Although this is a multifaceted task, two major focus areas will be key to making it a reality: recruiting and education.

Recruiting for accession, assignment, and promotion should have one primary, *overriding* principle: find and select people who can make the strongest contributions to national security and to winning a tough war either as direct participants or in providing needed support. This principle must supersede every other consideration to include diversity, gender, background, and class.

Education, at a minimum, must lead to members being comfortable with technologies and the science on which they are based, conversancy with the history of how nations have dealt with extreme threats, working knowledge of mathematics, statistics, and probability, and the ability to read critically, write clearly, and speak articulately. Clearly, every member of the force does not need to be an expert in all these areas, but sufficient numbers of those recruited and promoted must be capable of acquiring these skills or already have them.

To the extent proper selection depends on testing, the tests used must be carefully reviewed to ensure they are identifying individuals who meet the overriding criterion of being able to make maximum contributions to victory.

Conclusion

Si vis pacem, para bellum!

(If you want peace, prepare for war!)

It is now three quarters of a century since the last great power war. Although there is nothing inevitable about another war of this nature in the near future, that there would be one could hardly be surprising. Moreover, as capable as were the participants in those past wars, not a single one was a peer competitor compared to the United States. Given the non-negligible probability of such a conflict, the only rational action is national preparation. Unlike the past, peer competitors are on the horizon and the kind of peace the American people expect and demand is in serious jeopardy. Thus, the United States must do as the ancient Romans instructed, “if you want peace, prepare for war!”

Si vis pacem, para bellum is actually a powerful double entendre.³ First, if you are prepared for war, you are more likely to win and be able to transition back to a desirable peace; and second, robust preparation may preclude war from occurring, thus prolonging the existing peace.

This article has delineated the robust preparation necessary to set the stage for victory while simultaneously discouraging a would-be peer attacker. It has six requirements:

1. The national will to undertake preparations for war
2. A command process and structure designed to win
3. A sufficient, ready, survivable national defense to preclude US paralysis and to protect US offensive potential until it can be employed successfully
4. A sufficient, ready, survivable offense to respond quickly and impose paralysis on the attacker
5. A force manned by people who have the character and the mental and physical toughness to win
6. Plans practiced and ready to execute

In the political climate of what some are calling the second “Roaring Twenties,” finding the will even to think about a peer confrontation, let alone making the decisions to *para bellum* will be tough. Once there is agreement to think seriously about the possibility of a peer war, outlining and agreeing on the steps to prepare become feasible. This process is unlikely to start in the existing national security organizations especially if the party of the president is averse to ideas that increase the power of the United States vis-à-vis the rest of the world or ideas that attack a fundamental underpinning of deterrence theology—the impropriety of effective strategic defense.

3. Paraphrased from Flavi Vegetius Renati, *Epitoma Rei Militari*, Latin ed. (Charleston, SC: Nabu, 2010), 65.

If acknowledging the problem and planning to deal with it are unlikely to start in the national security bureaucracy, the American people must demand action. This can only come following a concerted campaign of education that uses all the tools of modern marketing: books, journals, social media, television, and radio. Ideally, an existing think tank or political party would take on the task, but absent one, it may be necessary to enfranchise a new one focused on this specific task. In the meantime, we must encourage speaking and writing by those who see the problem and are willing to lead the charge.

Creating a public demand for action may not be easy but is not without precedent. In the military sphere, the impetus for airpower development really came as a result of work by impassioned advocates such as Army Air Corps General Billy Mitchell. Without his efforts and those of a handful of like-minded officers and civilians, it is unlikely that airpower would have developed with such rapidity or that the United States would have been ready to build its aerial strategic offensive capability in time to deal with threats that materialized on both sides of the world in the World War II. It is my hope this article may help to spark the interest and dedication that will lead to the flames needed to illuminate the situation and mark the path to success. Æ

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RETHINKING “AIRPOWER VERSUS ASYMMETRIC ENEMIES”

MARK CLODFELTER

Airpower’s effectiveness against any type of enemy depends on how well it supports the positive political goals without risking the achievement of the negative ones. The framework presented, which includes a distinctive terminology categorizing various airpower applications with those categories helping to ascertain how effectively an application supports a political goal, offers no guarantee of success or failure, nor is it a predictor of the future. But it does charge those leaders who might apply airpower to think carefully before making that decision.

When I wrote this article in 2002, the war in Afghanistan had turned from a fast-paced, conventional war of movement into an intermittent, irregular conflict reminiscent of Vietnam. A year later, the invasion of Iraq similarly dissolved into an infrequent guerrilla war in which airpower’s ability to “turn the tide” became problematic. Using so-called asymmetric warfare, America’s enemies negated the vast aerial superiority of the United States because US political objectives could not be achieved through America’s desired application of aerial firepower.

The framework I presented in 2002, an outgrowth of almost 20 years of teaching airpower history, theory, and doctrine to students and practitioners—and trying to absorb their astute comments—sadly predicted America’s application of airpower in Iraq and Afghanistan would not yield success. Accordingly, I contend the framework has stood the test of time.

Gauging airpower’s effectiveness is not easy. One reason is that no universal agreement exists on the meaning of effectiveness. Clausewitz offers perhaps the best means of measurement: How much does the military instrument help toward achieving the ultimate aim of winning the war? He equates winning to achieving the nation’s political objectives, and that criterion guides my framework for evaluating airpower’s effectiveness.¹

Like all true frameworks, though, mine does not provide a set of standard answers, nor does it predict the future or offer a universal guide for success or failure. Instead, it offers a consistent approach for determining the value of airpower in any circumstance. This approach includes a distinctive terminology categorizing various

1. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 87.

airpower applications, and those categories help ascertain how effectively an application supports a political goal.

Yet, determining airpower’s political effectiveness is not a straightforward proposition because political goals are not always straightforward. As the discussion of the framework makes clear, those goals can be either positive or negative, which in turn can affect how well a particular airpower application can achieve them.

While the categories of airpower applications can be thought of as constants (the essence of how airpower is applied in each of the categories does not change), five key variables affect the ability of each application to achieve success: (1) the nature of the enemy, (2) the type of war waged by the enemy, (3) the nature of the combat environment, (4) the magnitude of military controls, and (5) the nature of the political objectives. The importance of each variable may change in different situations yielding different results. Thus, political and military leaders who employ airpower must understand exactly what the variables are and how they might blend to produce a particular outcome.

The framework provides a method for analyzing airpower applications—one that dissects the variables and examines how their integration may affect airpower’s ability to achieve political success. Hopefully, it also offers practical considerations and cautions for the statesman contemplating airpower’s use as well as for the commander charged with transforming political goals into military objectives.

Airpower and Its Applications

Before examining the framework’s particulars, a satisfactory definition of airpower is necessary. One offered by two Britons—Air Marshal R. J. Armitage and Air Vice Marshal R. A. Mason—works well: “the ability to project military force through a platform in the third dimension above the surface of the earth.”² Although Armitage and Mason admit their definition contains gray areas (e.g., whether airpower includes ballistic missiles or surface-to-air weapons), it suffices to guide the proffered framework. Indeed, their definition recognizes qualities of airpower “that are sometimes overlooked,” specifically its latent impact and its ability to apply force directly or to distribute it.³ These characteristics form the basic distinctions used in the framework to categorize airpower missions.

Airpower’s modes of application are key components of the framework. For instance, airpower poised for use but not actually engaged in an operation is a latent application—a potential impact—that corresponds to its deterrent value. In this case, airpower is not directly used in a contingency; rather, it is used as a threat. Examples of latent application abound: Adolf Hitler’s references to the Luftwaffe during the re-occupation of the Rhineland in 1936, President Harry Truman’s deployment of B-29s to England during the 1948 Berlin airlift, and President John F. Kennedy’s reliance on

2. M. J. Armitage and R. A. Mason, *Air Power in the Nuclear Age* (Urbana: University of Illinois Press, 1983), 2.

3. Armitage and Mason, *Nuclear Age*, 3.

Strategic Air Command B-52s and missile forces during the Cuban missile crisis of 1962, among others.

Although the framework acknowledges such latent applications, it primarily concerns itself with the actual use of airpower during a contingency. In war the application of airpower is twofold, based upon the purpose of the mission: it is either direct or indirect, and it is either auxiliary or independent. The direct application of airpower is the intended lethal application—designed to expend ordnance. Conversely, the indirect application of airpower is the intended nonlethal use, such as airlift, reconnaissance, electronic jamming, and aerial refueling.

Besides being direct or indirect, the application of airpower is also either auxiliary or independent. Auxiliary airpower supports ground or sea forces on a specific battlefield, whereas independent airpower aims to achieve objectives apart from those sought by armies or navies at a specific location. The auxiliary form includes both close air support and air attack against enemy forces on the battlefield who are not in contact with friendly troops. So-called strategic bombing—aimed at enemies' war-making potential before they can bring it to bear on the battlefield—exemplifies the independent application.

Yet the terms strategic and tactical often overlap and frequently blur. Many air attacks during the last half century's limited wars not only have affected the ebb and flow of a particular engagement but also have had significant strategic consequences. For instance, the purpose of US air strikes on mobile Scud launchers during the Persian Gulf War was to eliminate Iraq's tactical capability to launch ballistic missiles, as well as to placate the Israelis, which, in turn, kept them out of the conflict.

Because of such blurred distinctions, the terms auxiliary and independent seem better suited than tactical and strategic to delineate various airpower applications. The former pair, though, is not completely pristine, because the distinction between the two depends upon how the user defines the word battlefield.

In modern war, a specific battlefield may extend for many hundreds of miles; in an insurgent conflict such as Vietnam, the battlefield may be even larger. General William Westmoreland, US commander in Vietnam from 1964 to 1968, described his battlefield as "the whole country of South Vietnam."⁴ Such a parameter may seem extreme, but it illustrates the fact that the definition of the battlefield depends to a large extent on the type of war being fought. In a conventional conflict waged to seize or preserve territory, a battlefield's boundaries are likely to be much more distinct than those in a guerrilla war—especially one like Vietnam, Afghanistan, or Iraq.

According to the framework's terminology, each application of airpower has two designations: direct or indirect *and* auxiliary or independent. For example, the American bombing of the ball bearing factories in Schweinfurt, Germany during World War II was a direct/independent application; the Berlin airlift of 1948–49 was an indirect/independent application; the B-52 strikes around Khe Sanh, South Vietnam during

4. Quoted in John Schlight, *The War in South Vietnam: The Years of the Offensive, 1965–1968*, *United States Air Force in Southeast Asia Series* (Washington, DC: Office of Air Force History, 1988), 216.

the siege of 1968 were a direct/auxiliary application; and the C-130 airlift of supplies into the beleaguered Marine base at Khe Sanh was an indirect/auxiliary application.

The dual designators describe the purpose of individual airpower missions more clearly than the amorphous terms tactical and strategic. In addition, the framework’s focus on the intent of the mission highlights airpower’s inherent flexibility by showing that one type of aircraft—whether designated bomber, fighter, airlift, and so forth—can participate in different applications.

Air Superiority

What about the air superiority mission? Where does control of the air fit in the framework? The air control mission is either auxiliary or independent, depending on how the airspace is used. For instance, obtaining air superiority over Kuwait in 1991 to enable coalition ground forces to attack Iraqi troops represents a direct/auxiliary application. Achieving air superiority over Baghdad to enable aircraft to strike the city’s key communication and electric power facilities constitutes a direct/independent application.

On occasion, gaining air superiority can have both auxiliary and independent applications. The achievement of daylight air superiority over the European continent resulting from the “Big Week” operations in February 1944 is one such example. The subsequent air control guaranteed American bomber operations would continue against German industry and provided the prerequisite protection for the Normandy invasion.

While some might contend air superiority should be a separate category in the framework, it is not because air superiority is not an end in itself. Air control—which employs both direct and indirect methods—allows direct, indirect, auxiliary, and independent applications to occur. Similarly, the categorization of such indirect applications as aerial refueling, airlift, and reconnaissance depends upon the type of mission that they facilitate. For example, refueling fighters that provide close air support for ground forces would constitute an indirect/auxiliary application. Airlifting smart bombs for F-117 operations against targets in Belgrade during Operation Allied Force would be an indirect/independent application. And obtaining reconnaissance photographs of Iraqi frontline positions in Kuwait would be an indirect/auxiliary application.

War Aims and Application of Airpower

Yet achieving air superiority that facilitates a cross-channel invasion or securing reconnaissance photographs that lead to a breakthrough of Iraqi defenses does not necessarily imply a successful application of airpower. Only one true criterion exists for evaluating the success of airpower, regardless of whether it was direct, indirect, auxiliary, or independent. That criterion is the ultimate bottom line: How well did the application contribute to achieving the desired political objective? Did it, in fact, help win the war? Answering that question first requires a determination of what is meant

by winning. The war aims must be defined, and the application of airpower must be linked to accomplishing those objectives (fig. 1).



Figure 1. War aims and the application of airpower

War aims—the political goals of a nation or organization at war—can range from limited to total. Grand strategy blends diplomatic, economic, military, and informational instruments in a concerted effort to achieve those aims. Meanwhile, military strategy combines various components of military force to gain military objectives that, in turn, should help achieve the political goals. Attaining the military objectives may require a mixture of ground, sea, or air operations, and the forces performing those operations may act in either independent or auxiliary fashion. These definitions and connections are relatively straightforward.

Such linkages, however, are not the only ones that determine whether military force—airpower in particular—will prove effective in achieving the desired war aims. Besides being either limited or total, war aims are also positive or negative.

Positive goals are achieved only by applying military force, while negative goals, in contrast, are achieved only by limiting military force. For example, for the United States, the unconditional surrender of Germany in World War II was a positive political goal requiring the destruction of Germany's armed forces, government, and the National Socialist way of life; few negative objectives limited America's use of the military instrument. By comparison, in the Kosovo conflict, the United States had both the positive objective of removing Serb forces and the negative objective of preserving the North Atlantic Treaty Organization, the latter goal restraining the amount of force America could apply.

A similar example comes from the Persian Gulf War, although in that conflict the American aim of preserving the alliance was both a positive and a negative goal. That is, President George H. W. Bush had to commit American military force against Iraqi scuds to keep the Israelis out of the war, but if he applied too much force in the air campaign, he risked dissolving the coalition.

While some critics might equate the notion of negative objectives to constraints, doing so is a mistake because such objectives have equal importance to positive goals. Failure to secure either the positive or the negative goals results in defeat; victory requires that both must be obtained. The United States would not have succeeded during either

the Persian Gulf War or the Kosovo conflict had the coalitions that backed those enterprises collapsed.

Of course, the contradictory nature of positive and negative goals creates a dilemma: what helps achieve a positive objective works against a negative one. In a limited war, negative objectives always exist; the more limited the war, the greater the number of negative objectives. As President Lyndon Johnson tragically learned in Vietnam, once his negative objectives eclipsed his positive goals, he lost the ability to achieve success with any military force, especially airpower.

How do positive and negative objectives affect the application of airpower? On the one hand, the absence of negative goals encourages the design of an air campaign with few restrictions, such as World War II’s Combined Bomber Offensive against Germany or Twentieth Air Force’s assault on Japan. A preponderance of negative goals, on the other hand, limits the application of airpower.

Negative objectives have restrained American air campaigns in every major conflict since World War II—most recently in Afghanistan and Iraq. The restrictions typically appear in the form of rules of engagement, which are “directives issued by competent military authority that delineate the circumstances and limitations under which United States forces will initiate and/or continue combat engagement with other forces encountered.”⁵ The impetus for these directives comes from political leaders and their negative goals (fig. 2).

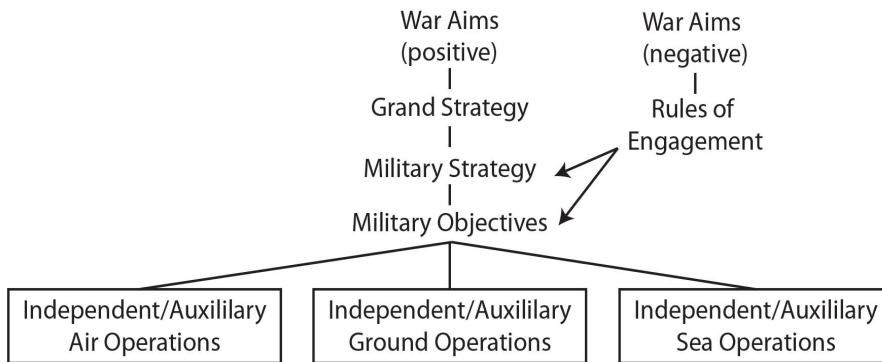


Figure 2. Effect of negative objectives on the application of airpower

The greater the number of negative objectives—and the greater the significance attached to them by political leaders—the more difficult it becomes for airpower to attain success in achieving the positive goals. This assessment is especially true of the direct/independent application of airpower. If negative objectives outweigh positive goals, they will likely curtail, and perhaps even prohibit, airpower’s ability to strike at the heart of an enemy state or organization. Yet before a user of the framework points

5. Chairman of the Joint Chiefs of Staff (CJCS), *Department of Defense Dictionary of Military and Associated Terms*, Joint Publication 1-02 (Washington, DC: CJCS, November 8, 2021), 188, <https://www.jcs.mil/>.

to this statement as a basic truth, he or she should realize that measuring positive versus negative objectives remains an inherently subjective activity.

Typically, positive and negative goals are not quantifiable; even when they are, comparing numerical results will likely equate to comparing apples and orange juice. Moreover, positive and negative objectives may be stated explicitly or only implied, which further muddies the water in terms of evaluating results.

Spelling out the objectives does not guarantee clarity, however, and the lack of clearly defined goals makes gauging their achievement particularly difficult. For instance, in Afghanistan, America aimed to achieve the positive goal of preventing a safe haven for future terrorist attacks against the United States, along with the objective of winning the hearts and minds of the Afghan people, a goal both positive and negative. Force was necessary to free Afghans of Taliban or Al Qaeda control, but too much force—especially applied indiscriminately or by mistake—undermined the effort to create an Afghan democracy. Reconciling those objectives, especially with quantifiable outcomes, proved impossible. Ultimately, though, that is how airpower's effectiveness must be measured: How well does it support the positive goals without jeopardizing the negative objectives?

Key Variables

In determining when airpower is most likely to help achieve the positive goals, the five main variables mentioned earlier come into play. These variables are complex factors that cannot be easily dissected, nor can one variable be considered in isolation from the others because the variables' effects are often complementary. Each has questions associated with it, and the questions provided are not all inclusive—others will certainly come to mind. Answering the questions differently for one variable may cause the other variables to assume greater or lesser importance.

Moreover, no formula determines what variable may be the most important in any specific situation or how their combined effect may contribute to—or hinder—the achievement of the positive goals. If all five variables argue against a particular application of airpower, however, that application is unlikely to be beneficial. The *assumptions* made in answering the questions for each variable are also of critical importance. If those assumptions are flawed, the assessment of the variables is likely to be flawed as well.

Nature of the Enemy

Determining the make-up of an opposing state or nonstate actor is essential to applying aerial force to defeat it. What military capabilities does the enemy possess? What is the nature of the enemy's military establishment? Is it a conscript force, volunteer military, or blend? Is the enemy population socially, ethnically, and ideologically unified? Where is the bulk of the populace located? Is the populace primarily urban or agrarian?

What type of government or central leadership apparatus does the enemy have? Are the individuals who lead strong or weak, supported by the populace or despised?

Or is the populace ambivalent? What is the leadership’s relationship with the military and its commanders? How resolute are the political leadership, the military, and the populace? What are the fiscal underpinnings of the enemy state or organization and is it self-sufficient in any area? How important is trade? What allies does the enemy have, and how much support do they provide?

If more than one enemy is involved, these questions must be asked about each enemy and a determination made about which one poses the greatest threat.

The Enemy’s Way of War

Airpower strategists must determine how the enemy fights to defeat it. Is the conflict a conventional war to seize or hold territory? Is it an unconventional guerrilla struggle? Is it an insurgency supported by a third party? Is the conflict a war of movement or a stagnant fight from fixed positions? How often does the fighting occur? Incidentally, this variable also affects airpower’s ability to achieve a positive political objective. In general, the direct application of airpower, whether applied independently or as an auxiliary function, works best against an enemy waging a fast-paced, conventional war of movement and has minimal impact against an enemy waging stagnant or infrequent combat.

The Combat Environment

Despite great technological advances, the basic structure of a combat environment can still thwart aerial operations. What is the climate, weather, terrain, and vegetation in the hostile area? How might they affect applications of airpower? As we learned in Vietnam, dense air can affect helicopter operations, while Afghanistan taught us thin air can do so as well. Are adequate bases available? Could real or potential allies provide them, and how could an enemy’s real or potential allies disrupt the desired use of airspace in the combat arena? What are the distances involved in applying airpower, and can those distances be overcome? What type of support—and protection—are required, key considerations for drone operations?

Magnitude of Military Controls

This variable involves constraints placed on airpower applications by military rather than political leaders. Ideally, no military controls exist, but that may or may not be the case—such controls can stem from many sources. Is there unity of command? What are the administrative arrangements for controlling airpower, and do those arrangements conflict with operational control? The “route package” system that segregated Air Force from Navy airspace over North Vietnam and helped trigger competition between the two services for sorties stands as perhaps the most egregious example of how command disunity can disrupt an air campaign.

Doctrine can also lead to military controls. Is airpower doctrine adaptable to different circumstances? What are the personal beliefs of commanders regarding how best to apply airpower? Personal convictions can play a significant role in limiting airpower

applications—witness the Korean War. Despite encouragement from the Joint Chiefs of Staff to bomb North Korean hydroelectric plants, Army General Matthew Ridgway, United Nations commander, refused to do so because he thought it would enlarge the scope of the war. His successor, General Mark Clark, had no such misgivings. One month after Clark took command, Air Force, Navy, and Marine aircraft attacked the facilities.

Political Objectives

Often, this variable is the most important. Are the positive goals truly achievable through the application of military force? Is the application of airpower necessary to obtain the positive objectives? How committed is the leadership that is applying airpower to achieving the positive goals? How committed is its populace? Can leadership attain the positive goals without denying the negative objectives? How do the negative objectives limit airpower's ability to help achieve the positive goals?

The direct/independent application of airpower seems to work best for a belligerent with no negative objectives—provided a suitable type of enemy wages a suitable type of war in a suitable type of environment free of significant military restrictions. For the United States in World War II, suitable conditions existed, and few negative objectives or military controls limited the application of military force. Since that conflict, however, negative objectives have played prominent roles in guiding American war efforts. For the United States in future wars, the prospect of fighting without them is remote indeed.

Conclusion

In the final analysis, airpower's effectiveness against any type of enemy depends on how well it supports the positive political goals without risking the achievement of the negative ones. The framework presented here offers no guarantee of success or failure, nor is it a predictor of the future. But it does charge those leaders who might apply airpower to think carefully before making that decision.

Clausewitz warned that “no one starts a war—or rather, no one in his senses ought to do so—without first being clear in his mind what he intends to achieve by that war and how he intends to conduct it.”⁶ That admonishment, delivered almost two centuries ago to readers who had fought against Napoléon with muskets and sabers, remains apt in the age of air warfare. Æ

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6. Clausewitz, *On War*, 579.

AIR POWER 2010–2020

FROM HELMAND TO HYPERSONICS

JOHNNY STRINGER

An examination of air power employment over the last decade yields lessons and deductions from some exceptionally challenging operations in deeply complex environments: geographical, political and informational, but also increasingly shaped by the information environment, and with multiple audiences, actors, and adversaries. The West and its allies are at an inflection point in the employment and utility of air and space power; we no longer own nor can dictate all the terms of the debate.

An air power author writing in mid-1991, especially one serving in an air force, would be forgiven for reflecting on the recently fought Gulf War and feeling a sense of achievement and perhaps vindication.¹ That war had demonstrated to allies, adversaries and competitors just what the fruits of the United States' Second Offset Strategy could achieve.

The key constituent parts—satellite navigation, air- and space-based reconnaissance, extensive and secure communications, miniaturisation, precision weaponry and stealth technology, underpinned by exponential increases in computing power—had been employed by the coalition air component with astonishing effect, allowing a 100-hour land campaign with a fraction of the allied casualties that had been predicted. The No Fly Zones that were established throughout the '90s appeared to bear out the idea that the West had pioneered a new way in warfare—a revolution in military affairs even—with air and space power at its core.

The more considered analyst would have seen signs in subsequent air operations over the Balkans and northern and southern Iraq that questioned such confidence. Political and coalition realities and constraints, confused strategic objectives, and the attendant operational challenges had limited or even at times neutered the air instrument. The Kosovo campaign of 1999 might have led some to see it as the zenith of air power; in reality, political pressures forced Milosevic's hand too.

Ten years later the score card was more mixed: the Taliban had been removed from power after 9/11, Saddam had been deposed (another showcase for sophisticated joint operations) but in Afghanistan and Iraq the Western coalition was fighting bloody

1. This article was originally published as a chapter in *The Conduct of War in the 21st Century: Kinetic, Connected and Synthetic*, ed. Rob Johnson, Martijn Kitzen, and Tim Sweijs (London: Routledge, 2021) and has been reprinted by permission of the publisher.

and violent insurgencies, with the land environment the main focus for military and political leaders alike. The seemingly swift and relatively bloodless experience of the 1990s had been replaced by drawn out counterinsurgency (COIN) campaigns, slowly leaching public support and political tolerance. Air power had become an almost wholly tactical instrument, supporting others but not making the decisive strategic campaign contributions of the relatively recent past.

The period 2010-2020 has offered fresh insights into the utility and evolving character of air and space power: continued operations in Afghanistan, whilst simultaneously being employed to protect the Libyan people from Gadhafi and ultimately allow for his overthrow. Having largely left Iraq by 2011, the West returned in 2014 to fight Daesh, conducting air operations over both Iraq and Syria.

This article explores air power employment over the last decade in these three campaigns, drawing lessons and deductions from some exceptionally challenging operations in deeply complex environments: geographical, political and informational, but also increasingly shaped by the Information Environment, and with multiple audiences, actors and adversaries. The West and its allies are at an inflexion point in the employment and utility of air and space power, and we no longer own nor can dictate all the terms of the debate.

The Essential Glue

Air and space power are essential to any modern campaign; it would be unthinkable to go to war or to conduct operations without assured access to both domains and thus the possibilities provided by the vertical flank. It doesn't follow that they are employed in the same way regardless of the fight, and thus the actual utility of both has seen different expression over the last 10 years. In Afghanistan, the preeminence of the land campaign drove the employment of tactical fast jets, the tasking and collection for intelligence, surveillance, and reconnaissance (ISR) assets and much of the Air Transport fleet's use too.

Both support and attack helicopters provided intimate land support—their *raison d'être*—to support individual tactical engagements. One could view the Afghan campaign as a series of tactical fights at varying scales, conducted across the country and orchestrated at the regional vice Theatre level. In the UK, an argument of “bayonets versus jets” or of tying UK fast jets to UK forces (and thus limiting them to being national and not Coalition/Theatre assets) indicated how polarised understanding and advocacy had become. The debate was only finally concluded when analysis showed that UK ground forces, especially its Special Forces, were getting multiples of Coalition air support in return for each UK air asset provided to the Coalition.

This approach also ensured that overall response times across Afghanistan were optimised, as well as allowing tasking of the best Coalition asset to each mission. A similar approach to the initial use of UK helicopter assets also risked effectiveness. Indeed, rotary wing lift had become a strategic and political issue by 2009 as a perceived lack of helicopters forced UK troops to undertake risky moves by vehicle or on foot. Once again, putting the UK rotary wing contribution into a coalition pot and

allowing optimum tasking and asset utilisation (provided by an RAF Joint Aviation Group commander) addressed both the tactical challenge and salved political angst. It was also indicative of how in the space of a few years, an understanding of the best use of air power had been allowed to ebb away.

Not Just COIN

Much of our employment of air and space power in the last 5 years would be familiar to crews operating in Gulf War 1 and through the 1990s: of note, the junior aircrew in the first half of that decade are now the senior commanders in their respective air forces. There are generations of operators for whom this way in warfare is a comfortable and well-practised default. Although US-led coalitions had to fight for air superiority and ultimately supremacy at points throughout the period from 1991 to 2003—the period bookended by the two Gulf Wars—the move to COIN operations for the following 10 years had both intended and unintended consequences.

For the former, an emphasis on unmanned air systems (drones) to provide extended overwatch and strike was symptomatic of a move away from the primacy of combat air and fast jets. The then chief of the US Air Force was fired in 2008, in part for his continued focus on the threats posed by a revanchist Russia and assertive China, and related support for the F-22 fighter programme. It could be countenanced by the perceived needs of the current fight and tactical support down to sections of troops, and permitted by our absolute dominance—indeed, ownership—of the electromagnetic spectrum (EMS). The Taliban could only contest control of the air by largely rudimentary engagements of helicopters and the occasional success against aircraft at operating locations, the attack at Camp Bastion in September 2012 being the most notable. Coalition access to air- and space-based reconnaissance assets, satellite communications and Precision Navigation and Timing was unfettered.

In Libya in 2011, early strikes to remove the SAM threat in the north of the country allowed the same approach to be employed, although occasional missile launches were defeated by coalition assets. What was fundamentally different was the *de facto* primacy of the air component: absent a Coalition land component, the land campaign was prosecuted by the local Libyan resistance to Gadhafi—effectively as proxy forces—aided by Coalition Special Operations Forces.

The paucity of assets and the size of the operating area proved especially challenging: from the 1000+ missions flown in a 24-hour period during Kosovo in 1999, the UK/French-led coalition could launch around 70-80 missions a day in 2011. No wonder that in the immediate aftermath of the campaign, at a closed door debriefing in London, a senior UK Government advisor opined that he was surprised that the Libyan campaign had taken 223 days “when Kosovo took 78, and it was an easier problem.” Participants were admirably restrained in their responses.

Air primacy over Libya was exercised through the combined air operations centre (CAOC) at Poggio Renatico in northern Italy under US Air Force Lieutenant General Ralph Jodice. The strategy for the campaign nominally rested with NATO Joint Forces Command Naples, but the approach devised at Poggio set the terms for how the coali-

tion operated. The air component was back to Theatre-level campaigning and employment, rediscovering targeting processes (and challenges) almost wholly absent in Afghanistan and needing to explain to the Coalition's political class some of the realities attendant in fighting a state, across the state. Three years later, and coincident with the withdrawal of the bulk of UK forces from Afghanistan and a supposed "reset" in our campaigning, the danger posed by Daesh (also known as Islamic State in Iraq and Syria - ISIS) forced the West and its allies to begin another Middle Eastern campaign.

Back to Iraq (and on to Syria)

For the UK, the air operations over Iraq and, subsequently, Syria, would generate the most significant and extended air effort since the Second World War. This campaign is also where a number of those factors, apparent over the last 20 years, have been realised, and where the themes noted above, and their trajectories, have come together. Indeed, we might be able to identify likely vectors over the next decade. The cautionary note is not to assume that all will emerge or be sustained, and none are likely to be overly dominant or defining. After all, it was only 10 years ago that some confidently asserted that COIN was the future of warfare. However, there are contextual, technological, societal, political and multi-domain aspects that are genuinely different and that have likely longevity and impact, especially on the employment of air and space power.

Firstly, the pervasiveness, breadth and penetration of the Information Environment, now amplified by the post-factual, "fake news" lens through which truth and reality have to emerge, hopefully undistorted. The UK's doctrine and operating concepts are rooted in the importance of securing and maintaining Information Advantage; the default should now be that kinetic actions underscore information operations and not the other way round. For those measuring air power's effectiveness (and national contribution) by counting weapons drops—still a factor in 2017—this requires fundamental recalibration: input-based measures of activity are no substitute for outcomes-focused measures of effectiveness and generate often perverse outcomes.

It also speaks to what was known in Afghanistan and became one of the accomplishments of the Libyan campaign, with information-led activity integral to our approach of full spectrum targeting. But it is not yet fully codified, nor should it set activity in only one place on the spectrum: at times, there is still a need to employ precise but significant lethal force to overcome the opponent.

The importance of the Information Environment is matched by that of the electromagnetic environment and the ability to maintain freedom of manoeuvre across the EMS. Air power is steeped in this (including radar, chaff, jamming and long range communications during the Second World War), but the years in Afghanistan in particular have had a damaging effect on competence and capability. Here, the EMS was ours, and the vital services provided—perhaps most obviously precision navigation and timing, satellite communications, and unchallenged air operations of all forms—were seen as almost a "free good" at point of use. They were expensive, but they were ours, and we built a way in warfare around them.

By late 2015, with the first Russian deployments to Syria, this had changed. Although rows of fast jets would have caught the eye, the most significant Russian capabilities were advanced double-digit SAMs, communications and GPS jammers, and a sophisticated radar and C2 network. Without firing a round or rocket, the deployment altered the operational context for coalition air assets, and generated a new, genuinely strategic set of challenges.

This anti-access/area-denial (A2/AD) umbrella in the eastern Mediterranean covered the key UK air base at Akrotiri and threw its protective bubble over Russian land, air and maritime assets. As noted previously, we knew this was coming—it was an inevitable counter to our way in air warfare prosecuted so successfully over 25 years. Noteworthy too that the imagery—iconography perhaps—of Russian military strikes looked remarkably familiar to that first seen in 1991: the overt emphasis on equivalence masked the reality of Russia's employment of 90 percent unguided weapons and the terror bombing of civilians in Aleppo and other cities.

Contextual and Campaigning Evolution

Societal and political factors have had increasing bearing on the use of air power and on the conditions governing its employment, and on the technologies within the instrument itself. Drones have been a bellwether for this phenomenon, and the UK experience is instructive. The RAF has operated Predator A and B drones (the latter the more advanced and capable Reaper model) since early 2005, but the UK elected to stay almost silent on their operations for several years. This de facto vacuum was filled by others, stating or insinuating various nefarious or even illegal activities on which they were employed.

Belatedly, the curtain was pulled back a little but the UK remains on the back foot, even when the reality is that drones are effectively conventional aircraft that happen to have a cockpit and crew several thousands miles distant. Political considerations will always inform operational policy, and the codified expression of this—allied to international law and conventions—are national rules of engagement (ROE).

Syria and Iraq have presented substantial targeting challenges as noted previously; the years of targeting individuals in unoccupied expanses of desert have not fitted military personnel well for the realities of employing precise but lethal force in dense urban environments against opponents for whom the people are targets, shelter, revenue and recruits. As the air component commander during the operations to liberate Mosul and Raqqah, every day posed numerous targeting challenges; keeping senior staff in the UK informed on these—and how we were overcoming them within the ROE—was vital ground in maintaining trust and confidence in our judgment and decision making.

The proximity of multiple actors provided further complexity: the battle space in Iraq and especially Syria was and is the most congested, contested, competitive and at times confused that any of us can recall in the last 30 years. The potential for tactical-level errors to have strategic consequences was ever present and required consistently

good analysis and judgement, often from relatively junior personnel in the CAOC and from coalition aircrew.

We should also reflect on the realities of campaigning in coalition, viewed from the perspective of the air component. If ROE reflect national policy positions, then it is axiomatic that they will differ across nations although all will be legally compliant: this translates into mission types or target sets that one or more nations might be unwilling or unable to conduct or prosecute, even if they have the professional and technological ability. It is also a truism that the more meaningful the contribution, the greater the level of political and other risks nations must be willing to accept.

Once again, tactical limitations can have unforeseen strategic and/or campaign consequences. Commanders must continually review their permissions and delegations to ensure they are appropriate for ever-evolving missions and be willing to argue for refinement if necessary. It may also be that standing ROE have been deliberately limited; the case for unlocking them has to link the tactical requirement and benefit with the oversight that will ensure risks are managed and kept below the agreed threshold. This will almost certainly require high-level government and ministerial approval: commanders must possess the advocacy and antennae to operate in this environment too.

Operations against Daesh also provided the best example yet of integrating effects across multiple domains. With air- and space-based assets collecting ever-increasing imagery, signals intelligence and other intelligence data, their centrality to rapid understanding is a given; the ability to fuse this with all source intelligence, including from our cyber operations, is where real and decisive advantage is rooted. Multi-Domain Integration across tactical, operational and strategic levels remains a work in progress and is not yet our default setting, but we have made significant inroads in recent years.

The work in late 2016 and early 2017 to understand Daesh's vehicle borne improvised explosive device (VBIED) capability and then target it across the enterprise represents an excellent example of both opportunity and challenge. A conventional approach might have sought to 'soak' likely areas of interest with the ISR assets we could muster (but prejudicing other high-priority tasks) and have strike assets on call to engage (but tying them geographically and by mission).

Instead, patient and imaginative interagency work allowed the coalition to understand how Daesh developed and fielded their VBIED capability—down to what we could call the lines of development—and the CAOC staff then refined its intelligence effort against key nodes. Given the commercially available Chinese drones used by Daesh, alongside those built by their own nascent armaments industry, this included activity many miles from the battlefield. The challenge, beyond maintaining necessary operational security, included preserving tactical and operational patience across coalition HQs, where early strikes would have failed to achieve the overwhelming effect of coordinated action. The simultaneous strikes conducted in early 2017 were a precursor to a number of other similarly well-integrated actions as the physical "Caliphate" was reduced to its final few square miles.

Regaining our Advantage

Much of the above speaks to a democratisation of what previously were high-end capabilities, the product of expensive and leading-edge technology and thus for many years largely the preserve of top-tier Western nations, much of it from the United States. Today, traditional competitors have achieved at least near-peer status in almost all areas of air and space power; worryingly, their investment in countering and exploiting the EMS whilst we were focused on violent but relatively unsophisticated COIN campaigns has been well worth the cost. Western nations are playing catch up, rethinking old lessons on resilience and dispersal whilst regaining competence—if not yet competitive advantage—in areas such as hypersonic weapons.

Western air power is challenged at both ends of the spectrum too: Daesh drones may have been unsophisticated when compared to a Reaper, but were employed across four of the five core air power roles—intelligence, strike, command and control, and counter-air (when attacking Russian aircraft at Hmeimim Airbase in Syria). As with the cyber domain, the price of entry is now remarkably low, and imagination in employment has a value all of its own. It is also worth reflecting that digital and IT connectivity allowed Daesh to mass produce weaponry to remarkably precise tolerances at multiple sites, from mortar rounds to the stabilising fins for repurposed 40mm grenades, dropped by drones on Iraqi Security Forces and the forces of the Syrian Democratic Front.

Daesh drones represented their own air power capability, whilst the raft of commercially available satellite-supplied or enabled information, data and communications made them space power users. Our own technological advances were being used against us. Equally, this provides vulnerabilities for us to exploit and it is entirely reasonable to see as much upside here as downside. If one pulled the key tenets of the last 10 years of air and space operations, including capability development and across allies and adversaries, the following key themes are apparent and can be argued to have genuine longevity. We will need to be active and anticipatory if we are to continue to regain and maintain advantage.

We will operate continually and fight episodically; success in the former, and especially in the grey zone of subthreshold and hybrid military activity will limit the latter. How we deploy our air assets as routine business will thus need to simultaneously reassure, deter, provide training and force development/experimentation opportunities and be integral to our messaging and our narratives. It is unlikely that their operations will be solely single domain-specific and they will almost certainly need to nest with multiple military, security, and other lines of operation.

In the recent past, we have at times struggled to maintain the right relationship between the diplomatic, information, military and economic (or DIME) lines of operation: successful military operations can be for naught if they are significantly out of alignment with, or outpacing, actions in these three other key areas. Increasingly, failure to understand and operate with agility within the information line might be the difference between success and failure.

We will also need to strike the right balance between demonstrating capability (as well as resolve) whilst keeping our most advanced capabilities and tactics secret and secure. This will only accelerate the move towards synthetics and the need for high fidelity synthetic environments within which we will train, test and experiment—routinely across multiple domains too. Our actual environments will be increasingly complex; Iraq and Syria is a foretaste of this. Global population growth and competition for resources will fuel much of this through the myriad malign consequences that will flow. We are likely to see urban operations as increasingly common (they were pivotal in both Libya and against Daesh) as population growth in cities continues across the world.

As a result, the nature of command in the air environment will almost certainly change too. Senior air commanders are too comfortable with the tactical and the technological; those who have gained recent operational command experience have been frustrated by the institutional inertia and memory that privileges joint command to those from other components, notably the land environment.

The US Air Force is investing heavily—conceptually, financially and in its people—in multi-domain operations. This, and key enabling elements such as the Combat Cloud, speaks to a step change in how air and space operations are planned, integrated and conducted in the future. This will need commanders with the experience and insights traditionally prized, married with the ability to exploit digitisation in its many forms and to visualise courses of action and possible outcomes in ways we have not been able to before. The opportunities of “digital twins” and routine, cross-government and multinational exercising will be a commonplace.

We will need to develop our people differently than at present—something the UK has recognised across its joint professional military education. We will move beyond both the autodidact and professionally curious, whilst the most talented will find his or her career a rich experiential and developmental pathway where air force posts are planned against those in the joint/integrated force and even interagency. Solely being the best tactical operator is not going to cut it, but operational experience and the realities of combat will still have both a premium and a value.

Most importantly, our way in air warfare will need to change, and our developing ways in space and cyber will need to be imaginative and unconventional. Arguably, we should recognise that the Third Offset Strategy already exists and is that developed and employed by our adversaries. We have continually developed and refined second offset technologies and their employment; in doing so, much our playbook has been studied by others and effective counters developed to limit or neuter our advantage. Some are asymmetric and beyond a counterforce solution: Russian and Chinese information operations are now commonplace—from elections to pandemics—and financial muscle affords influence across multinational fora.

All help create a favourable geostrategic context within which to exercise multiple levers of national power, including the military. The West “won” the Cold War through multiple means, including targeted spending on advanced capabilities that the USSR could not afford to match. We do not have that luxury now; indeed, one

could argue that both China and Russia are in a sweetspot of technological development, affordability, near/ actual peer capability and deployable mass. We will need to think and do differently.

Technologies and Tempo

Encouragingly, the main strands of what could represent that new way in air warfare are in either conceptual or actual development. The technologies of the second offset strategy will continue to be developed, because used intelligently they continue to confer relative advantage. If attempting to negate them requires significant and active use of the EMS, then this helps develop our understanding and provides opportunity for both hard and soft counters; some of these means will be from other domains to allow required operations in air and space.

As such, the individual domain concepts that we develop will need a unifying purpose at their heart and will—by design—be interoperable and integrated to an extent not seen before. For coalitions and alliances, the trick will be to bring different nations up to the required level routinely, and able to be more sophisticated when required. Sharing information seamlessly, across multiple classifications and fusing myriad sources will be essential; harnessing the potential of artificial intelligence, machine learning and human machine teaming will make sense of the vast data lakes of information, sorting wheat from chaff and allowing human engagement ever further up the value chain.

This in turn will accelerate and multiply Boyd's OODA loop in a way that its inventor would have approved. Faster, more accurate understanding will allow swifter, better decision making and, allied to a raft of pan-domain effects and those exercised on the diplomatic, information and economic lines, generate multi-domain tempo that we see infrequently at present. Nor is this wishful thinking: all of these aspects were employed against Daesh in 2017 albeit occasionally, and doubtless elsewhere. More worryingly, they have also been employed at least in part against us too.

We will need to leverage the variety of talent and free (not "permitted") thinking across our alliances and partners—a strength of democracies and a weak point for autocracies. And air forces will need to be more focused on the need to engage and shape public and political understanding and debate about emerging technologies. We are rightly bound by higher legal, moral and ethical standards than our opponents and must continue to be; but without engagement and education, we run the risk of investing multi-billions yet having technologies without permissions. One relevant area is autonomy and the extent to which human approval within a potentially lethal targeting chain is required or provided: Human On or In the Loop is thus not an arcane intellectual talking point, but a fundamental decision for national polities as they look to develop and employ future technologies within their forces.

A more profound question might be whether air and space become—for air, return to—genuinely strategic domains where our actions offer both strategic choice for us and dilemmas for our opponents. From Overy to O'Brien, historians have noted how, in the Second World War, Western air power underpinned and enabled a strategic war

fighting concept that avoided heavy attritional land campaigns—as suffered by the Soviets in the east as they finally overwhelmed an equally attrited Wehrmacht.

Thereafter, it was used as a continuous campaigning tool and method, whether in its own right or in concert with land and maritime power. In an early example of integrated activity to secure information advantage, we might think of the fusion of air and maritime power with ULTRA intercepts from Bletchley Park to win the Battle of the Atlantic. It is then more than a little disappointing that we have allowed our thinking on the air instrument and its strategic utility to atrophy over the last few decades, content to be a supporting junior component to the supposedly more important activity being done by others. We have lost the sense of air power as a political instrument too, just at the time where the strategic context—and the need when continually “operating” to be able to protect, engage and constrain—places a premium on this attribute.

Final Reflections

It would be brave and a little foolish to unthinkingly re-energise the claims made by early air power theorists, but where ambition then outpaced technology, it might be true that it is now our ambition that is in lag. Our air and space operations of the last decade have been at the heart of a Western way in warfare, but an over-emphasis on technology and tactics has often stymied assessment of what strategic purposes air power can service—in short, what it is for and what it allows.

The emphasis placed on COIN operations saw the dangers of “main effort” becoming sole effort realised, and we are still dealing with the unintended consequences when developing air and space power capabilities that are fitted for an era of persistent competition. However, we have inspiration and example to draw upon over many decades, and from its earliest days air power was seen as a strategic instrument. It continues to offer political choice: the drawn out, land-environment-dominated campaigns in Iraq and Afghanistan generated political risks, whilst both Libya and the campaign against Daesh have highlighted the agility and flexibility of air power, even if political outcomes have been or remain uncertain.

Air power has an inherent and innate capacity for integration too, across domains and with the widest array of agencies and organisations: the standard operating procedures that allow complex multinational air operations are the wellspring for this, and the time/speed/distance-crunching potential of both air and space platforms speak to agility and responsiveness. We might usefully reflect on whether we need to reconnect with what this affords at the operational and strategic levels, rather than over-concentrating on the technological and tactical as ends in themselves. Our opponents certainly have. Æ

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