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Key Points

Any assessment of the likely landscape of future conflict must recognize no matter what type of engagement, the outcome will increasingly be determined by the side better equipped and organized to gather, process, disseminate and control information.

The traditional warfighting paradigm of surface forces leading the fight, supported by air forces, has been supplanted by a construct where air forces supported by surface forces are often a much more responsive, effective, efficient and less costly approach to conducting warfare—in terms of lives and dollars.

Airpower has already evolved to become the indispensable force in modern war, and it will only grow in capability and criticality, by offering options to respond to the most wicked security challenges facing the US and its allies in the years to come.

The St. Andrews Proclamation: A Pragmatic Assessment of 21st Century Airpower

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Abstract

Today, airpower technology has caught up with—and to a degree, bypassed—early airpower theory. The potential now exists to dramatically expand the effects of airpower as means to achieve security goals and objectives. In the future, the US and its allies should not be bound by the historical limitations of surface warfare-based doctrines of airpower supporting ground forces, but rather should advocate and articulate the tactical, operational, and strategic advantages of engagement options where airpower is the key force, supported by surface forces. Given the entrenched position of surface warfare officers in command positions of militaries around the world—particularly in the US over the last 17 years—it remains an open question whether the security options and capabilities that airpower yields—even as they expand in scope and scale—will be recognized and considered by national leaders. Forwarding these ideas and concepts will require the same degree of boldness and courage the pioneers of airpower displayed to initiate, develop, articulate, and effectively advocate for new capabilities. US Airmen need to expand their vision, understanding, and knowledge of all things Air Force, but most importantly, they must completely understand the fundamentals of why air forces exist as independent services, educate others as to the potential that airpower offers, fight for a seat at the table where force employment options are decided, and strongly advocate for airpower options where they are most appropriate.

Introduction

Change, with respect to the military in general, and airpower in particular, involves four principal factors—advanced technologies, new concepts of operation, organizational transformation, and the human dimension.¹

Here are how these factors all relate to informing the future: Advanced technologies and the new capabilities they yield, enable new concepts of operation that produce order-of-magnitude increases in our ability to achieve desired military effects. Organizational transformation codifies changes and enhances the ability of the US and its allies to execute our respective national security strategies. The final and essential element to progress is the human dimension. People are fundamental to everything we do, especially when it comes to planning for and executing combat operations.

Accordingly, I've outlined my remarks generally into four broad areas. However, before addressing them let me give a short assessment of the 21st century security environment facing the US and its allies.

The 21st Century Security Environment

Today, US and allied defense strategies must contend with non-state and transnational actors; a rising economic and military powerhouse in China; a resurgent Russia; declining states (some of which possess nuclear weapons); the increasing likelihood of nuclear weapons proliferation; evil actors of the most despicable nature; and a dynamic web of global terrorist organizations.

Second, the pace and tenor of our lives has been irrevocably altered by the speed of change. Global trade, travel, and telecommunications have produced major shifts in the way we all live. Such developments are not isolated. Speed and complexity have merged—and now permeate the conduct of warfare.

Consequently, one implication for the future of warfare is that military forces must be able to respond rapidly and decisively anywhere on the globe at any time. Key security events now unfold in a matter of hours and days, not months or years. The window to influence such circumstances is increasingly fleeting. This places a premium on

airpower's rapid response—lethal as well as non-kinetic response—anywhere in the world. This cannot be said of land or sea forces, both of which are subject to the tyranny of time and distance.

Third, the US, its allies, and the global community have to contend with increasing personnel and procurement costs at a time when defense budgets are stagnating. Therefore, the provision of flexibility of response across a wide spectrum of circumstances should be foremost among the decision criteria we apply to future military strategies and investments. This too is a strength of airpower.

Fourth, moving into the future, the US and its allies must acknowledge that deploying large numbers of ground forces into foreign lands to “win hearts and minds” vice accomplishing a defined mission and then leaving has become counter-productive to securing desired strategic outcomes. That approach resulted in decades long wars that slowly but inexorably drained our blood and treasure, while undermining our political will and standing in the world. Strategies centered upon occupation expose US and allied forces to vulnerabilities, result in anti-occupation backlash, domestic disapproval in the US and in allied nations, and create destabilizing effects within the very state or region they are intended to secure.

Fifth, the US and its allies must actively pursue and invest in options to counter increasingly advanced “access denial strategies” and technologies. Precision weapons and stealth projected incredible effects and capabilities at the end of the Cold War. These have now proliferated, and future adversaries are now equipping themselves with these systems.

Sixth, the US and its allies need to challenge our potential adversaries' domination of public perception. In short, we have to learn how to use the application of accurate, compelling information as a core element of our security apparatus. We are woefully inept at strategic communications and too often put ourselves in a reactionary versus proactive position in struggling to gain domestic and international public support.

Finally, information's value also extends past the media and public sphere. Just as wireless connectivity, personal computing devices, and cloud-based applications are revolutionizing life

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in the civilian sector, these trends are also altering how our military forces project power. Faster and more capable networks and computing capabilities are turning information into the dominant factor in modern warfare.

We all need to understand that fifth generation aircraft like the F-22 Raptor and F-35 Lightning II are information systems above and beyond being fighters that shoot missiles and drop bombs—they are, in fact, “sensor-shooter-effectors.” Given this reality, the US and its allies must now acknowledge that information and its management are just as important today as the

traditional tools of military power—airplanes, satellites, infantry, and warships. Information is the force evolving all weapon systems from isolated instruments of power into a highly integrated enterprise where the exchange of information and data will determine military success or failure today and into the future.

These facts have major implications throughout the modern military enterprise, shaping key areas like doctrine, organization, training, acquisition, and sustainment, and command and control. Top leaders in the defense and national security policy community must adjust to the new realities of information age combat operations. Cold War-style, occupation-based, and counterinsurgency paradigms fall woefully short when examining how to apply military power in the 21st century.

These trends provide a starting point for anticipating the future all nations will have to contend with. Bluntly stated, all the US military services, the ministries of defense of allies and partners, and all other elements of collective security architectures have been slow to recognize the emerging new security environment. Their focus has remained on traditional weapons platforms. The US and its allies still have institutions and processes that were designed in the middle of the last century to accommodate what is now viewed—in retrospect—as a rather simple world of kinetics and traditional domains that largely characterized the Cold War security environment.

I suggest that the US and its allies need to supplement our traditional focus on combined arms warfare with a broader lens that exploits non-kinetic tools, the cyber domain, the rapid translation of information into knowledge, and airpower as a means of quickly transforming these capabilities into desired effects.

The proliferation of technology, flow of information, and the associated empowerment of nation-states, organizations, and individuals presents one of the most daunting challenges the US military and its allies have ever faced. How will airpower fare in this rapidly evolving security environment of the future?

Technology’s Future Potential, Applied to Airpower

Today, observers and officials alike can identify progression in some technology areas that hold great potential promise for the advancement of airpower in the future. Here are some of the areas I believe will result in significant new airpower capabilities:

Uninhabited aerial vehicles: The acceleration of the use of remotely piloted aircraft (RPA)—or better known by their flawed conventional label as “drones”—will continue to transform modern war. RPA will quickly evolve, and transition into a much more autonomous capability, able to assist airmen in their mission tasks across the spectrum of airpower operations. The future will see remotely piloted aircraft increasingly replaced by aircraft flying autonomously. At the same time, a human will be “on the loop” controlling the effects of these autonomous aircraft.

This will lead to revisiting the terminology that has traditionally described this capability. The term RPA was first introduced in 2009 to ensure it was understood that humans were in control of uninhabited aerial vehicles. I suggest a new descriptor for the next generation of these aircraft, along the lines of a “coordinated autonomously piloted aircraft” (or CAPA) to distinguish the use of aircraft flying autonomously vice those actually remotely piloted.

Fast space: The concept of “fast space” explores how air forces can form private sector partnerships to create a virtuous cycle of launch cost reductions of between three and ten times

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lower than the cost of today's space launches. Doing so could enable completely new approaches for US and allied air forces to defend operational coalitions, protect interests, and enhance opportunities to exploit the unique global advantages of the ultimate high ground of space.

A "fast space" architecture envisions an ecosystem of capabilities that makes speed the defining attribute of advantage in space. In this approach, speed describes both the supply and demand sides of the space market. On the supply side, fast space envisions sortie-on-demand launch capability, made possible through economically viable business cases, high launch rates, sustainably lower costs, rapid turnaround, and higher reliability. On the demand side, fast space enables users at all levels of conflict, from tactical to strategic, to harvest new advantages in and through space.

Hypersonics: Hypersonic flight, at five times the speed of sound and above, promises to revolutionize military affairs in the same fashion that the combination of stealth and precision did a generation ago. Hypersonic air weapons offer advantage in four broad areas. They counter the tyranny of distance and increasingly sophisticated defenses, they compress the "shooter-to-target window" to open new engagement opportunities, they rise to the challenge of addressing numerous types of targets, and they enhance future joint and combined operations. Within each of these themes are other advantages which, taken together, redefine airpower projection in the face of an increasingly unstable and dangerous world.

Artificial intelligence (AI): Many years ago, as the head of US Air Force intelligence, surveillance, and reconnaissance on the Air Staff, I coined a phrase to try to get the point across to the US Department of Defense that we needed to get a grip on the massive amounts of data we were collecting from aerospace sensors. The phrase I used was that "we are swimming in sensors, so we need to avoid drowning in data." Today, on a daily basis, the US military only processes about one to two percent of the data our sensors collect!

The solution to that challenge, was and still is, the application of artificial intelligence (AI) to data analysis. But the potential of AI goes far

beyond analysis. The maturation of AI will enable a variety of new military concepts of operation in the future. One currently being researched is the "loyal wingman" concept, which allows for automated control of uninhabited aircraft in a variety of roles, dramatically expanding the capability and capacity of aircraft. The more complicated the battlespace, the greater the demand will be for those "wingmen" to have algorithms allowing them to respond in cases where the human controller cannot directly guide or coordinate them. Swarms of aircraft will similarly require AI for coordination.

Most importantly, AI is the key to allowing its wisest application in future conflicts, related to the continuous operational cycle known as the "OODA Loop"—where US and allied service members will be able to observe, orient, decide, and act faster than potential adversaries can do so themselves. AI will help accelerate the US and allied OODA loop across complex environments, faster, and enable successful combat operations in highly contested scenarios.

Directed energy: Today, with modern airpower operating inside the atmosphere, the US and its peer allies can impose kinetic effects at the speed of sound. With the maturing of hypersonic weapons, we will be able to do that at several times of the speed of sound. However, imagine the ability to impose kinetic effects at the speed of light. The realization of the routine employment of directed energy weapons will truly be game-changing for US and allied air forces.

If the long awaited, and often promised but not materialized, maturation of directed energy weapons becomes a reality, these weapons will eliminate the distinction between fighters, bombers, and every other anachronistic characterization of military aircraft that possess effective directed energy weapons. All types of aircraft will be able to conduct both offensive and defensive missions regardless of the mission-specific characteristics of their design.

Now, consider the application of directed energy weapons to spacecraft and their potential to impose kinetic effects inside the earth's atmosphere—both to vehicles on the surface and in the air. Using directed energy from spacecraft to achieve kinetic effects against other objects in space will probably be realized before directed

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energy is militarily effective inside the atmosphere. This day is rapidly approaching. It is likely a matter of years, not decades, before such weapons are in place and ready to be used by one or more powers capable of creating them.

Even before the maturation of directed energy weapons, powering uninhabited aircraft via directed energy laser beams could very soon increase endurance and allow larger payloads, with high-bandwidth data sent back over the same beam.

The ubiquitous and seamless sharing of information: Any assessment of the likely landscape of future conflict must recognize that no matter what type of engagement, the outcome will increasingly be determined by which side is better equipped and organized to gather, process, disseminate, and control information.

Desired military effects will increasingly be attained through the interaction of multiple systems, each one sharing information and empowering one another for a common purpose. It is a concept that can be envisioned as a “combat cloud”—an operating paradigm where information, data management, connectivity, and command and control are core mission priorities.

This vision represents an evolution whereby individually networked platforms transform into a broader “system of systems enterprise” integrated through domain and mission agnostic information linkages. This approach will not only change the way new requirements are defined, but more importantly, the way the US and its allies think, command and control, and operate those systems. This is the essence of the “combat cloud”—this concept is not just the network, it is an entire enterprise of sensors, shooters, and connectors that are all part of a cohesive, coherent whole. While the combat cloud will extend across all operating domains, air and spacecraft will be the centerpieces of this architecture.

Cyber operations and electronic warfare: The intersection of cyber operations and electronic warfare will continue to grow, and in doing so,

will play an increasing role in contributing to the capabilities of the combat cloud. Effects achievable with offensive cyber operations are fundamentally challenging the traditional model of combined arms warfare, and indicate the need to shift to a combined effects approach. The combined effects construct puts cyber operations and electronic warfare on the same level as operations in the traditional domains, treating them as principal means of warfare, not simply supporting elements to the old combined arms construct.

There are other promising technologies that we have all yet to imagine, but are sure to hold breakthroughs just as dramatic as the development of supersonic flight, operations in space, precision weapons, low observability, and others.

In addition to the development of new technologies, the major challenges of deploying, employing, and sustaining expeditionary forces utilizing these new capabilities across the globe are twofold. First, there is the fundamental difference in the nature of air and surface forces. Air forces can be rapidly deployed and employed anywhere in the world in a matter of hours, even from thousands of miles away. Surface forces—on both land and sea—unless pre-positioned to the specific region of concern, take weeks or months to deploy, depending on the size of the force elements required.

Second, as mentioned earlier, the explosive growth in the ease and speed at which ideas and technologies are being formulated and spread around the world has yielded new, more unpredictable threat environments. Rapid advancements in the capabilities of our potential adversaries all present unique challenges and expose vulnerabilities. The ability of the US and its allies to deploy, employ, and sustain military forces for the purposes of deterring or countering malicious actors or adversaries is becoming ever-more contested.

The spread of advanced technologies, enhanced by rapid advances in computing power, places increasingly sophisticated capabilities in the hands of potential adversaries, in addition to the hands of the US and its allies. The range and scale of possible effects with these new capabilities present a new military problem set that threatens the allied expeditionary warfare model of power

projection, freedom of action, and maneuver. As a result, it begs for new operational concepts and doctrine to exploit advancing technologies to deter, and, if necessary, defeat future adversaries. So, let's take a look at just what those new operational concepts and doctrine might be.

Operational Concepts and Doctrine _____

One of the most significant changes in the evolution of modern warfare is the result of the combined impact of three technological changes: 1) modern intelligence, reconnaissance, and surveillance (ISR) yielding persistent multi-spectral ISR; 2) the normalization of the use of precision weapons; and 3) the dramatic improvement of system survivability (low observability, or stealth). This combination has resulted in the reversal of the traditional paradigm of the use of air and surface forces to defeat adversaries.

The traditional warfighting paradigm of surface forces leading the fight, supported by air forces, has been supplanted by a construct where the use of air forces, supported by surface forces, are often a much more responsive, effective, efficient, and less costly—in terms of both lives and dollars—approach to conducting warfare.²

Validating this observation, one platoon leader during Operation Iraqi Freedom in 2003, who served at the leading edge of the push to Baghdad by the 1st Marine

Expeditionary Force, wrote: "For the next hundred miles, all the way to the gates of Baghdad, every palm grove hid Iraqi armor, every field an artillery battery, and every alley an anti-aircraft gun or surface-to-air missile launcher. But we never fired a shot. We saw the full effect of airpower. Every one of those fearsome weapons was a blackened hulk."³

In the context of this paper, the point of raising this realization is not to start a doctrinal roles and functions fight between armies and air forces, but rather to highlight the fact that capabilities change over time, and the fundamental causes should be exploited by the US and its allies

to our advantage. This is particularly true in an era where potential adversaries are working hard to negate the advantages developed by the US and its allies over the past quarter of a century.

To best meet the challenges of future peer and near-peer adversaries, we must continue to exploit modern ISR, routine precision strike, improvements in survivability, and better maneuver capability by focusing on two key essential actions. First, unshackle the surface-centric organizational paradigms of the past and embrace more functional joint and combined organizational constructs that can be achieved by greater integration of military service components. Second, rapidly capitalize on the capabilities of the information age to realize the ubiquitous and seamless sharing of information across systems in every domain as a vision for the militaries of the US and its allies.

Today, the world's leading military powers are at a critical juncture in history. We are at the center of an, "information in war revolution" where the speed of information, advance of technology, and organizational design are merging to change the way we operate. This change has dramatically shortened decision and reaction times, and reduced the number of weapon systems needed to achieve desired effects. For example, in World War II it took months, thousands of Airmen, and hundreds of aircraft to neutralize a single target. Today, the US military and its allies can find, fix, and successfully engage multiple targets with a single aircraft within minutes.

Since the introduction of mechanized technology in the early 20th century, the scale and scope of combat has been governed by industrial means of power projection. Advances in aircraft, ships, and ground vehicles saw increased speed, reach, and precision. However, mass remained an essential aspect of force application. In the 21st century, we face another technology-driven inflection point that will fundamentally reshape what it means to project power. Advancements in computing and network capabilities are empowering information's ascent as a dominant factor in warfare. No longer will it be sufficient to focus on simply managing the physical elements of a conflict—airplanes, satellites, tanks, amphibious elements, or ships at sea.

These individual platforms have evolved from a stovepiped, parochial military service

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alignment to a loosely federated “joint and combined” construct. To be effective in the future, these same forces must become a highly integrated enterprise collaboratively leveraged through the broad exchange of information. Said another way, the desired effects of military operations will increasingly be attained through the interaction of multiple systems, each one sharing information and empowering one-another for a common purpose. It is a concept that can be envisioned as a combat cloud—an operating paradigm where information, data management, connectivity, and command and control are core mission priorities.

While mechanical technology will continue to serve as a key factor in future military operations, the information empowering these systems will stand as the backbone maximizing their potential. As the combat cloud concept is developed, it promises to afford an expansive, highly redundant defense complex with radically enhanced data gathering, processing, and dissemination capabilities. These attributes will offer actors at every level of war, and in every service component, dramatically enhanced situational awareness by transforming masses of data into decision-quality knowledge.

This approach will not only change the way the US and its allies define new requirements, but (more importantly) the way we think about operations, ISR, command and control, and support. A distributed, self-forming, all-domain combat cloud that is difficult to challenge, and self-healing when it is attacked, significantly complicates an enemy’s planning and will compel them to dedicate more resources toward their own defense. In its ultimate instantiation, the combat cloud will be: 1) strategically dislocating to any challenger; 2) provide conventional deterrence to a degree heretofore only achieved by nuclear weapons; and 3) will enable operational dominance in multiple domains.

Turning this vision into reality will require a significant effort. While many militaries are evolving toward information-optimized forces, the integration and assimilation of related capabilities is

incomplete. Forces are still predominantly organized, trained and equipped to fight a mechanized war—one in which information integration is a secondary support function. Most bureaucratic organizations and current programs of record reflect the linear extrapolation of combined arms warfare construct developed in the industrial age. Program oversight efforts within our respective ministries of defense are also lagging—with antiquated industrial age governance impeding information age endeavors. Furthermore, with budget austerity likely to continue for the foreseeable future, the US and allied militaries need to devise more effective and efficient means to secure desired effects with existing capabilities. The combat cloud concept is a paradigm that allows the realization of this goal.

If the US and its allies are going to win the next great war, we need to gain persistent access to data networks, while denying this same capability to any adversary. To be serious about this effort, military services need to embrace doctrinal and concept changes to how their forces are organized, trained, and equipped. The concept of the combat cloud stands as a framework to empower this vision.

Commanders must change the way they view networks and information systems. Rather than value only the weapons and platforms that launch them, leaders need to recognize the value of the effects they can create based on the seamless sharing of information. This shift in perspective will involve much more than simply material changes involving technology. Indeed, this mindset is a completely different way of thinking about how weapon systems will be used in the future.

The US and its allies need to think beyond the constraints that traditional military culture imposes on new technology. For example, fifth generation aircraft such as the F-22 and F-35 are termed “fighters,” but technologically, they’re not just “fighters”—they are F/B/A/E/EA/RC/AWACS-22s and 35s. Similarly, the new B-21 Raider will possess capabilities much greater than the “bombers” of the past. These new aircraft are actually more properly described as flying “sensor-shooter-effectors” that will allow the US to conduct information age warfare inside contested areas whenever desired—if we fully exploit their non-traditional capabilities to the degree they become accepted as the new “traditional.”

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Modern sensor-shooter-effector air and spacecraft are the key elements of effective future air forces, and will become the nucleus of the combat cloud concept because of their rapid reach and global perspective. However, this is not merely a recycled vision of “net-centric warfare” applied to air and spacecraft. It is a concept where every US and allied force element and person is a component, router, and node in a real-time internet protocol (IP)-based constellation with low latency to enable accurate desired effects against priority targets.

The combat cloud as an operating paradigm will require an entirely different methodology for the command and control of airpower along with the weapons and forces operating in the other domains. Command and control must keep up with the changes imposed by three major

interrelated trends: emerging threats, new technologies, and the increasing velocity of information. The changes in these three areas have been dramatic since the design and establishment of the current Air and Space Operations Center (AOC) concept.

Changes and improvements in technology, helped along by the increasing capability of modern telecommunications to rapidly transmit information to, from, and between various levels of command, have led to many examples of “information age” operations where tactical level decisions were usurped by commanders at the operational and even strategic levels. In fact, post Operation Desert Storm

in 1991, most airpower engagement decisions that involved lethal force have been pushed to the highest levels of command. This occurred for a variety of reasons, a study worthy of a book in and of itself, but the larger point is more succinct.

The devolution of the airpower command and control tenet of centralized control/ decentralized execution, to one of centralized control/centralized execution has caused reduced effectiveness in accomplishing airpower mission objectives. Recall that this approach was the Soviet Union’s construct of command and control, and while this philosophy might work in permissive airspace in small scale operations, when waging

war in contested airspace in large-scale operations, this approach is sure to fail. The US and its allies demonstrated this in Operation Desert Storm when Iraq employed centralized control and execution doctrine. Commanders must discipline themselves to operate at their respective command levels if airpower is to realize its potential in the future.

The challenges of emerging threats, information velocity, and advanced technologies demand more than a mere evolution of current command and control paradigms, but rather a new approach that capitalizes on the opportunities inherent in those same challenges. The US and its allies cannot expect to achieve future success through incremental enhancements to current command and control structures—that method evokes an industrial-age approach that has lost its currency and much of its meaning. The requirements of information age warfare demand not “spiral development,” but modular, distributed technological maximization that permits and optimizes operational agility. This will not be achieved without dramatic changes to our current airpower command and control concepts of operation.

In order to capitalize on the advantages of moving to the distributed paradigm of the combat cloud, the US and its peer militaries must move toward distributed command and control, and shift to an evolved version of the “centralized control/ decentralized execution” model, embracing “centralized command/ distributed control/ and decentralized execution.” The details for how to accomplish this must be left for another study, but it is sufficient to say that command and control of airpower is fundamental to its success, and must be adapted to become more agile and rapid if the combat cloud concept is to be optimized to its fullest potential.

With respect to US interoperability with its allies, US partners around the world are modernizing their armed forces with new military capabilities that have the potential to enhance the effectiveness of a combat cloud-enabled force. Specific systems include the F-35, the Eurofighter Typhoon, the Rafale multi-role fighter, Aegis-equipped ships, the P-8 Poseidon, E-7A Wedgetail, RQ-4E Eurohawk, a new Franco-German combat

aircraft, and others.

Transforming these individual weapon systems into collaborative elements of an interdependent operational enterprise is what the combat cloud is all about. Whether discussing technical standards, common training standards, or established operational tactics, the potential afforded by individual systems of US allies will only be realized if they are harnessed in an organized, deliberate fashion.

In the future, the US and its allies must possess an agile operational framework that enables the integrated employment of joint and allied military power. It means taking the next step in shifting away from a structure of segregated land, air, and sea warfare approaches to truly

integrated operations. The central idea is cross-domain synergy: the complementary employment of capabilities in different domains, instead of merely additive employment—such that each capability enhances the effectiveness of the whole and compensates for the vulnerabilities of other assets.

Transitioning from industrial age, platform-centric methods of force employment to a combined-effects approach of interconnected, information-driven actions involves numerous challenges. It

will require a review of, and appropriate changes to doctrine, organization, training, material, leadership, personnel and education, facilities, and policy. Policy must define a “template” to guide the following as well: modernization policy, acquisition and concepts of operation, seeking collaborative solutions among the services, moving from measures of merit that replace cost per-unit to cost per-desired effect, eliminating stove piping of kinetic and non-kinetic options, developing reliable, robust, and anti-jam means of communication and data transfer, creating sufficient diversity of employment approaches to avoid single points of failure, and realizing automated multi-level security to ensure coalition participation.

The combat cloud concept inverts the paradigm of combined arms warfare—making

information the focal point, not the domains in which military services operate. This concept represents an evolution where individually networked platforms—in any domain—transform into a “system of systems” enterprise, integrated by domain and mission-agnostic linkages.

That said, airpower has already evolved to become the indispensable force in modern warfare, and it will only grow in capability and criticality in offering options for the solution to the wicked security challenges that lie ahead. In the future, the US and its allies should not be bound by the historical limitations of surface warfare-based doctrines of airpower supporting ground forces, but rather should advocate and articulate the tactical, operational, and strategic advantages of engagement options where airpower is the key force supported by surface forces.

Dr. Phil Meilinger succinctly highlighted this point in a recent book on airpower, where he writes about the concept he calls “asymmetrics,” and a new strategic paradigm in warfare. He states: “We must constantly search for new ways of fighting, and not merely using new weapons to fight in the old ways.”⁴ The cultural and doctrinal barriers to the realization of these new ideas and concepts are pronounced, across the US and other militaries. Given the entrenched position and predominance of surface warfare officers in command of militaries around the world—especially pronounced in the US military over the last 17 years—will the security options and capabilities that airpower yields be recognized and considered by national leadership? Time will tell.

Airpower Advocacy and Education _____

In the early 1900’s, pioneers of aviation sought freedom from many of the restrictions imposed by their peers. They slipped the surly bonds of earth to introduce to the world a new power in warfare—airpower.

Just last month we celebrated the 100th anniversary of the Royal Air Force (RAF). Last year we celebrated the US Air Force’s 70th anniversary as an independent US military service, and also marked the 110th anniversary of US military airpower.

It was in August of 1907 that the first US military organization was formed with a specific

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Today, airpower technology has caught up with—and to a degree, bypassed—early airpower theories. The potential now exists to dramatically expand the effects of airpower as a means to achieve security goals and objectives. To do that, however, will require the same degree of boldness and courage of the pioneers of airpower to initiate, develop, articulate, and effectively advocate for these new airpower capabilities.

focus on airpower. That organization was the Aeronautical Division of the US Army Signal Corps. It was the precursor of today's US Air Force, and at that time it had exactly 10 balloons that were used to conduct reconnaissance—the 1907 equivalent of modern-day ISR.

In 1908, the Army's Signal Corps acquired their first dirigible and a trial airplane. In 1909, the US Army purchased an improved Wright Flyer that was formally inducted into service—named “airplane number one.” The lack of creativity aside, it is impressive to note that it was only four years

after the first documented flight of a manned aircraft in 1903 that airpower's military potential was formally recognized with the establishment of the first flying unit. That's the kind of forward thinking, envelope pushing, and advancing established boundaries that's been the hallmark of military airpower, and of airmen, ever since.

It occurred because of pioneers with a vision for the potential of airpower, that was not yet within reach, strongly advocated for and successfully articulated those theories—concepts that far preceded its actual capabilities.

Today, airpower technology has caught up with—and to a degree, bypassed—early airpower theories. The potential now exists to dramatically expand the effects of airpower as a means to achieve security goals

and objectives. To do that, however, will require the same degree of boldness and courage of the pioneers of airpower to initiate, develop, articulate, and effectively advocate for these new airpower capabilities.

The US and its allies face a complex series of security challenges today and for the foreseeable future. We are not going to buy our way out of these challenges—the money isn't there—nor are there silver bullet solutions. We are not going to blast our way out of these problems with overwhelming

force, as we no longer have the force structure enjoyed in the past. We are going to have to think our way out of these problems, and to succeed we need to exploit one of our greatest asymmetric advantages—the brains of airmen—US Air Force Airmen in particular.

US Airmen, and their allies, need to expand their vision, understanding, and knowledge of all things related to the modern US Air Force, but most importantly, to completely understand the fundamentals of why air forces exist as independent services. They must also educate others as to the potential that airpower offers, fight for a seat at the table where force employment options are decided, and strongly advocate for airpower options where they are most appropriate.

Unfortunately, the record of the last two decades is not positive with respect to any of these four elements. The reasons for this are complex and nuanced, but here are some key points to consider.

First, an incorrect understanding and application of “jointness” has taken hold both in the US and with its allies. Since the 1986 passage of the Goldwater-Nichols Act in the United States, the “joint” course of action was to move contingency organizations and operations from independent, de-conflicted, service-oriented approaches to sustained interoperability. Other nations adopted this approach. How well militaries have done that, where the US and its allies are today, and where we ought to be heading is a subject best tackled in another study, but the degree of jointness exhibited since 1986 has ebbed and flowed based on the commanders in charge of specific operations or campaigns, and the degree—or lack thereof—that senior military leadership encouraged joint organization and execution. The rationale and purpose of jointness is well intentioned, and optimizes the use of service component forces if properly understood and defined.

Jointness means that among separate services, a distinctly developed and highly specialized array of capabilities is provided through service or functional components to a joint or combined force commander. His or her job is then to assemble a plan from among this “menu” of capabilities, applying the appropriate ones for the contingency at hand—with each contingency being a bit different than the last. It does not mean separate

services deploy to a fight and simply align under a single commander. Nor does jointness mean every service or entity necessarily gets an equal share of the action. Jointness is recognizing that to be joint the US and its allies require separate services, and that it's an imperative that service members understand how to best exploit the advantages of operating in their domains. Articulating the virtues and values of your service is in fact "being joint."

Jointness is not homogeneity—it is not "going along to get along. It is recognizing that to be joint the US and its allies require separate and distinct military services, and that it is crucial that leadership understands how to best exploit the advantages of operating in those domains. The reason joint or combined force operations create synergies is because this approach capitalizes on each services' core functions—functions that require much time, effort, and focus to develop the competencies required to exploit operations in their respective domains.

There are many military and civilian leaders that don't understand that to have jointness, the separateness of the services is a requirement. It takes 25 years to hone the expertise required to be a great division commander

in the Army, a battle group commander in the Navy, or a joint force air component commander in the Air Force. The construct of joint operations requires that we have strong and competent armies, navies, and air forces.

However, to capitalize on the potential true value of jointness, air forces need to have a seat at the table in option development, planning, and execution of joint operations and command of forces and organizations where most appropriate. These conditions have degraded over the past quarter of a century—at least in the United States—and they need to be corrected.

To understand the state of affairs with regard to formulating military options in past campaigns, there was a lack of real "joint" organization during

combat operations in Iraq and Afghanistan. More often than not a "J" was simply put in front of a US Army organization, and the matter was settled. Combined Joint Task Force (CJTF) Mountain in Afghanistan, in the initial months following the September 11, 2001 terrorist attacks, only had US Army personnel assigned. In Operation Iraqi Freedom, there was a Multi-National Corps-Iraq, but no Joint Task Force-Iraq. Later, as Operation Enduring Freedom ground on, NATO formed the International Security Assistance Force (ISAF), and the US formed US Forces-Afghanistan—but there was never a JTF-Afghanistan, with associated service components.

This absence of real "jointness" in the first decade of the 21st century has continued. It manifested itself in the current organizational structure of Operation Inherent Resolve (OIR), the campaign against Islamic State forces in Iraq and Syria. When operation against the Islamic State started in 2014, President Barack Obama clearly stated that there would be no US ground forces involved in combat operations in Syria or Iraq. The only US force involved in combat operations—with the exception of a small number of special operations forces—was airpower. However, the commander of Combined Joint Task Force-Operation Inherent Resolve has been a US Army corps commander through four iterations to date. The US Army's component for US Central Command (US CENTCOM) wouldn't put an Army division commander in charge of a Navy aircraft carrier battle group, but yet has no problem with putting an armor corps commander in charge of an air campaign.

Perhaps if there was an Airman in charge at some point in the last few years, the air operations against the Islamic State would have been designed as an air campaign against a state, rather than as another chapter of the counterinsurgency campaigns waged in Iraq and Afghanistan that were the recent experience of the US Army commanders in charge. Perhaps then the Islamic State would have been nullified in three months instead of taking three years. Completing that operation rapidly we would not have given the Islamic state the gift of time—over three years to perpetuate their ideology of evil and spread it to over 30 additional countries, or time to allow

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terrorists to move out of Syria, or time to continue the slaughter of innocent men, women, and children in the region.

The US Army-dominated CENTCOM leadership is on the record many times saying the campaign would be a long-term endeavor. That's how Armies think because they generally move at the speed of infantry—single digit miles per hour. It takes a division commander in the US Army 25 years to master the terrain that a lieutenant in the Air Force flies over in 90 seconds—think about that fact and its implications for operational approaches to campaign design.

This is why true “jointness” matters. Every service component leader has a moral obligation to think of the best way they can achieve desired effects in support of US or coalition aims. Top

leaders can assess which option is favorable. When a service surrenders their voice in this process, they may be putting the objectives of the US or coalition at risk, and putting lives unnecessarily in danger if their approach, which may have never gotten to the senior decision-makers, was actually a better option that could secure objectives and save coalition lives.

Back in 1930 Billy Mitchell succinctly stated: “The advent of airpower which can go straight to the vital centers and entirely neutralize or destroy them has put a

completely new complexion on the old system of making war.”²⁵ Who is speaking like this in the air ranks today?

Who offered the alternative of rapidly terminating the Islamic State's ability to effectively function by rapidly crushing them in Syria as a first priority, as opposed to rebuilding the Iraqi Army and then assisting it in regaining lost ground in Iraq? I posit that in OIR the latter could have been accomplished much quicker if an air-based strategy against the Islamic State in Syria was selected over the ground-based strategy applied that treated airpower as simply an aerial artillery element.

In the interwar years of the 1920s and 1930s, airmen pioneered aviation technology, then devised concepts of operation around the potential of that technology, following that up with associated airpower doctrine. The value of this progression of technology, concepts, and doctrine was seen in the World War II post-war Strategic Bombing Survey assessment which concluded that the air campaign was a “decisive” factor in securing the Allies' victory over Germany. Thank goodness airmen of the time articulated and fought for that option.

Who and where are those airmen today?

We should all be very mindful that a generation of occupation-based, ground-centric military strategies seeking to win hearts and minds, and trying to press 16th century tribes into modern nation-state democracies, has created a dearth of articulate airpower practitioners and advocates in the ranks of the US armed services. Airmen of the past two decades have been lured into a mold of compliance and silence. Compounding that compliance in the United States, when Air Force leadership in the first decade of the 21st century did advocate for a strong US Air Force, they were promptly removed from office.

The strategic level failure of the last nearly two decades of US Army doctrine in multiple iterations should have lit a fire in the airpower community. Airmen should have been striving to seek optimal alternatives. However, Airmen articulating alternative options have largely gone missing. I believe that can be attributed to a fundamental misunderstanding of jointness, as described above.

As a service, the US Air Force went for nearly four years between 2006 and 2010 with not one of its officers in any of the top 11 positions in the Pentagon. Those positions being, the Chairman of the Joint Chiefs, the Vice Chairman, the Director of the Joint Staff, nor was an Airman assigned to any of the senior Joint Staff directorates, such as head of manpower; intelligence; operations; logistics; strategic plans and policy; command and control, communications, computers and cyber capabilities; joint force development; or force structure, resources, and assessment.

Since the establishment of regional combatant commands for the US military—the warfighting commands—there have been a total

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If the US and its allies are going to optimally exploit the virtues and values of airpower to meet the challenges of the future, our security establishments need a proper understanding of why independent Air Forces exists; a proper grasp of jointness; and a sense of “airmindedness” that all airmen should embrace as a foundation of their being.

of 107 commanders. Only seven have been US Air Force officers. That is less than seven percent of the regional combatant commanders in the entire history of the Department of Defense that have been from the Air Force. Five of those seven were put in place within the last seven years, the result of a concerted effort on the part of several recent Air Force chiefs of staff to assist the Department of Defense in becoming more joint.

Much work remains to be done institutionally to close the jointness gap. The family of US joint doctrine publications put out by the Joint Chiefs of Staff has a volume on petroleum and water distribution (Joint Publication 4-03), but none on strategic attack. Why is that? Because the other services are threatened by the thought of airpower used in a fashion other than in support of surface warfare. The most egregious recent example is that the most qualified, experienced, and knowledgeable senior officer in the entire US military in the Asia-Pacific area of operations was not nominated as the next commander of US Pacific Command (PACOM) simply because he was an Air Force officer. Of course, a Navy admiral got the nomination—never mind he only had one tour as a junior officer in the theater he is now set to lead. These are but a few examples of symptoms that are a result of a lack of advocacy, articulation, and engagement by Airmen since the September 11, 2001 attacks, and a lack of proper understanding of jointness.

If the US and its allies are going to optimally exploit the virtues and values of airpower to meet the challenges of the future, our security establishments need a proper understanding of why independent Air Forces exists; a proper grasp of jointness; and a sense of “airmindedness” that all airmen should embrace as a foundation of their being.

These examples bring to mind a quote that seems appropriate: “If you’re not at the table, then you are on the menu.” It is well past time for air forces around the world to get off the menu and start talking turkey—and not be the turkey,

waiting to be carved up.

Airmen need to think like architects—not bricklayers. They need to relate to bringing vigilance, reach, and power to whatever task they are given, not just offer solutions for a given weapon system. Air Force members today need to fully appreciate that they’re all “Airmen first” with a connection to an enterprise much larger than their particular specialties. This connection is inherent in the unique way in which US and allied airmen think, more than it depends on the particular job we first learn entering our respective air forces.

Airpower is based on the characteristics of technology—but the invention, development, and application of those instruments flow from human imagination, and knowledge. Air Forces seize on the virtues of air and space to project power without projecting vulnerability, and as a result, it can provide the US and its allies with strategic alternatives simply not available any other way. But to do so we need to create a culture and environment that encourages disruptive thinking instead of discouraging it. The Air Forces of the US and its closest allies were founded as a result of disruptive thinking, but at the beginning of the 21st century, many modern air forces may have fallen into complacency in that regard as a result of the pressure of what can only be called “joint political correctness.”

The US and its allies are not going to meet the budget challenges of the future by simply buying less of what we already have—we must embrace and invest in innovation, creativity, and change. But is the military today “walking that talk,” or not? Have we all become too risk adverse? How would Hugh Trenchard, Clément Ader, Hugh Dowding, Billy Mitchell, or Bernie Schriever act today if they were still alive? I think they’d be trying to change our current surface-centric military culture to one that embraces the advantages of operating in the third dimension of aerospace as a primary means of securing our objectives, not simply one of supporting another medium of operations. Airpower options shape, deter, and dissuade so we can attain fundamental interests minimizing the need for combat operations. When combat is necessary, aerospace capabilities yield a variety of strategic, operational, and tactical effects that

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provide disproportionate advantages.

In some nations, each of their military services possess air arms—the army, navy, and marine corps. Those air arms exist to facilitate their parent services’ core functions—their mastery of operations on the ground, at sea, or in a littoral environment. However, a nation’s military has only one Air Force—not just another air arm. Its reason for being is to exploit the advantages of operating in the third dimension of air and space to directly achieve their nation’s security objectives. It is this unique and specific focus that makes aerospace power an asymmetric advantage.

What early airpower pioneers called “air-mindedness” is the perspective that seeks how to best apply airpower to meet a nation’s security objectives. It also encompasses how to effectively articulate those capabilities so the US and its allies’ political leadership incorporate them as alternatives of choice.

Conclusion

The challenge before the US and its allies today is to transform in order to dominate an operational environment that is rapidly evolving, while countering potential adversaries who are rapidly advancing in capability.

In the face of disruptive innovation and cultural change, the US military and its peers can maintain the status quo, or they can embrace and exploit change. I suggest that the latter is preferred.

The US military services need to learn how to better and more rapidly adapt new technology to the innovative concepts of operation that technology enables. The US intelligence community, military, and other security institutions (as well as those of its allies) will suffer if their internal organizations fail to adapt to new, disruptive innovations and concepts of operation.

Just as combat tomorrow will look different than it did yesterday, so too should the military with which we prosecute it. We should take maximum advantage of the asymmetric capabilities our nations possess with their air forces operating in

conjunction with their land and maritime forces in innovative ways. A concerted focus on further developing and expanding airpower capabilities and capacities would serve our allied nations well, as they are uniquely positioned to underpin the kind of defense strategy and force structure appropriate to the future.

Airmen embrace the ability to rise above the constraints of terrain, literally, and to transcend the strictures of a horizontal perspective. As airpower perspectives moved into space, a theory of the indivisibility of aerospace power materialized as the technologies of air and space merged in application.

By the end of the 20th century, the evolved combination of air and space technologies enabled great accuracy and assured access from aerospace systems. This combination yielded a concept of operations to achieve control over an enemy’s essential systems no longer defined simply by levels of destruction. By imposing very specific effects on an adversary from means employed from air, space, and cyber, airpower can effectively impose strategic control over the outcome of a conflict.

It is a methodology that realizes an adversary’s ability to operate as desired is ultimately as important, or even more so, than the destruction of the forces it relies on for subjugation. This effects-based or outcome driven approach to warfare expands the options for the conduct of warfare beyond the attrition and annihilation-based models that define surface warfare. Airpower going forward holds the potential to accelerate and amplify this approach.

Gen Hoyt Vandenberg, the US Air Force’s second chief of staff concluded his final speech to Air University by saying, “You have got to go out and preach the doctrine of airpower and never give an inch on it. You will be places where you are going to meet people who do not understand air power, and you are going to have to educate.”

I can’t think of a more appropriate note upon which to close, and to urge everyone to follow Vandenberg’s counsel—not just for the benefit of the US Air Force and the air forces of its allies, but for the benefit of all our nations. ★

Endnotes

- 1 Author's note: This paper is adapted from remarks delivered by the author at "The Present and Future of Airpower" conference on May 9, 2018, held at the Buchanan Lecture Theater in St Andrews, Scotland, UK. The conference was held in conjunction with the University of St. Andrews' Institute for the Study of War and Strategy. In this paper, the term "airpower" is used in its larger context of including all operations that take place in the third dimension above the surface of the earth. Operations in space—and to a large part in the cyber domain—are inclusive to the term "airpower."
- 2 Author's note: For a comprehensive treatment on this phenomenon see, "The Urgent Necessity to Reverse Service AirLand Roles," by Price T. Bingham, *Joint Forces Quarterly*, No. 84, (First Quarter 2017).
- 3 Nathaniel Fick, *One Bullet Away: The Making of a Marine Officer* (New York: Houghton Mifflin, 2005), p. 289.
- 4 Phillip S. Meilinger, *Limiting Risk in America's Wars: Airpower, Asymmetries, and a New Strategic Paradigm* (Annapolis, MD: Naval Institute Press, 2017).
- 5 William Mitchell, *Skyways: A Book on Modern Aeronautics* (Philadelphia, PA: J.B. Lippincott Company, 1930), 255.

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