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Our installations are combat platforms from which we generate air, space and cyberspace power. These platforms and the Airmen that operate, protect, and maintain them are integral to our ability to project combat power. Tomorrow's battlefield requires agile and resilient multiskilled Airmen and scalable and adaptable bases; both must blend together seamlessly. Deliberately assigning all Airmen a role in fighting and recovering a base strengthens the bond between Airmen and mission generation and ultimately creates the combat support synergy critical to success in future conflicts.

—Maj Gen Theresa C. Carter, Commander
Air Force Installation and Mission Support Center



The alarm sounded at 1310L, just as many Airmen were returning from lunch. Terrorist activity was reported near the base, and the threat was determined to be imminent. As the base rapidly worked through elevating force protection conditions, Airmen streamed from buildings to predetermined rally points where they formed into squads, took roll, and waited to arm-up. At the same time, mobile armories deployed from the logistics readiness squadron. Within 90 minutes, about 600 Airmen were armed and ready to assume their “battle stations” in base defense sectors of responsibility throughout the installation. As command and control was established and posting requirements were met, security forces pulled back into a mobile posture, ready to fill gaps in the defense and provide expertise wherever it was required. Predesignated supplies were distributed to base-defense-sector command posts. Airmen not immediately needed for base defense were sent back to work areas or home to rest for later shifts. In just under two hours, the base was transformed from a quiet, peacetime operation into a combat-ready airpower platform ready to repel a level II ground threat.¹The base could maintain this posture almost indefinitely.

This scenario may sound like fiction, but it is not; it recounts a “Fight the Base” (FTB) exercise at Scott AFB, Illinois. By providing basic “shoot, move, and communicate” skills training to Airmen of the mission support group, wing leaders harnessed existing manpower for base defense—manpower that otherwise would have been directed to shelter-in-place during emergencies. This construct can also be used to harness the same manpower under a “Recover the Base” (RTB) plan for response after an enemy attack or natural disaster. In an increasingly complex threat environment where safety is no longer determined by distance from the “combat zone” and in light of emerging operational concepts that count on fewer Airmen trained in more skills, the FTB/RTB concepts offer a way for the Air Force to use all Airmen to maximize the full capability of the air base as a combat platform.

Fight the Ship

The idea of deliberately organizing all available manpower to work outside their primary duties in times of emergency is not new to the US military. The Navy’s battle-tested “Fighting the Ship” capability, which involves treating the ship and its entire population as a single weapons system, is the foundation of this concept. On a ship, when the commanding officer orders, “General quarters! All hands man your battle stations,” all available seamen immediately report to their prescribed battle stations to enable the ship to fight at “maximum capability.”² The Navy further capitalizes on the training and readiness of its seamen by employing all available hands during an emergency or disaster experienced by the ship.³ In such a scenario, again, “general quarters” is called, and all Navy personnel report to their assigned battle stations prepared to respond to the emergency at hand.⁴ Prior training, including firefighting; basic damage-control procedures; chemical, biological, and radiological defense; and first-aid procedures, readies the ship to immediately mitigate and/or control the effects of the emergency.⁵

Strategic Imperative

Today's global security environment is the most unpredictable I have seen in 40 years of service.

—Gen Martin Dempsey, 2015

Neither is the idea of organizing and including all Airmen in base defense and recovery operations totally new in the Air Force. In response to emerging lessons learned in Operation Iraqi Freedom, the Air Force Requirements for Operational Capabilities Council requested a doctrinal change recommendation (DCR) in 2006 to address gaps in the service's ability “to adequately detect, assess, deny, and respond to ground threats in the Air Force's battlespace.”⁶ One of the DCR's two primary components was “transforming the Service culture from a Cold War, garrison-centric force to a ‘fight the base’ expeditionary culture . . . where all Airmen will have an active role in defending the installation.”⁷ The intent of the DCR was to deliberately mold the collective power of combat-trained Airmen into an operational capability by assigning them “battle stations” in base defense.⁸ The FTB concept was later captured in draft Air Force Instruction 10-250, “Installation Arming and Response,” and was executed selectively but never employed throughout the service.⁹

The rationale behind the FTB construct is more relevant today than ever before. According to former secretary of defense Leon Panetta, the US military is at a “strategic turning point.”¹⁰ Less than two years removed from a war that lasted more than a decade, the military services confront a global security environment that is as fluid as it is complex and dangerous.¹¹ Adversaries continue to narrow the advantage gap enjoyed by the US military by making gains in antiaccess weapons technology, and security challenges necessitate military readiness levels poised to confront the full-spectrum of military operations from both traditional state actors and substate groups.¹² Couple this operating environment with a future characterized by a smaller force and continued spending limits, and the need to create a multiskilled, agile, and resilient force becomes no less than an operational imperative.¹³

The 2015 Department of the Air Force publication *America's Air Force: A Call to the Future*, which captures the expected environment over the next 30 years, emphasizes this operational imperative. This strategy document explains that tomorrow's battlefield will find itself in increasingly contested areas as the advancement and “proliferation of long-range precision strike weapons will allow any location on earth to be held at risk.”¹⁴ Airmen will have to fly, fight, and win both inside and outside the “traditional” battlespace. This future environment increases the risk of catastrophic damage, both to main and forward operating platforms, and could inflict high casualties on deployed members.

Central to equipping the force to operate in such a dynamic and dangerous environment is institutional agility—the creation of a flexible, adaptable, and responsive force.¹⁵ In operational terms, agility enables the Air Force to adapt and respond quickly to adversarial actions, exploit available resources, and actively employ resiliency measures across the spectrum.¹⁶ The FTB and RTB concepts build a force ide-

ally suited for this environment—multiskilled, lean, and agile. This new concept will offer a capability that allows the Air Force to radically augment the “collective power” of base-defense forces either inside or outside the continental United States, send forward smaller teams to support dispersed operations, and reduce the human and physical footprint of contingency bases; indeed, they are force multipliers.¹⁷

Fight the Base, Recover the Base

The FTB/RTB concepts apply the Navy model to an air base by treating the base as a shiplike combat platform. The foundation of the FTB/RTB plan is a capability created by deliberately organizing Airmen on an installation into emergency response teams and including them in base defense or disaster-response plans. Under this construct, Airmen are organized into 44-person flights, each led by a company grade officer and a senior noncommissioned officer with a 3-person headquarters staff. A flight contains 3 13-person squads composed of a squad leader and 3 4-person fire teams, each of which has a leader and 3 fire team members (fig. 1). This basic organizational structure provides appropriate leadership and is tailorable to mission requirements. It also supplies building blocks that easily plug into a security forces base defense force and civil engineer base-recovery teams.

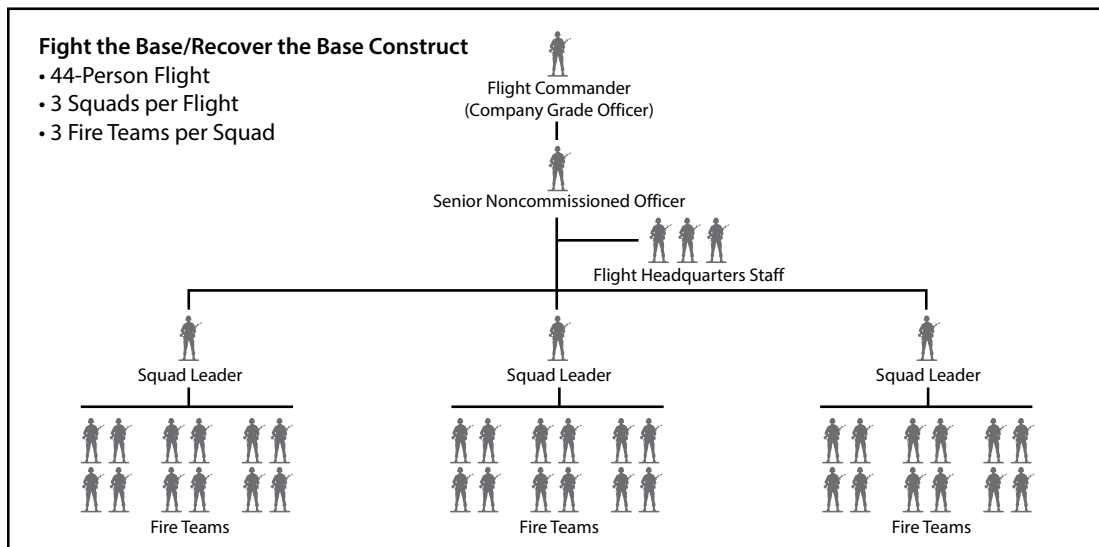


Figure 1. Standard flight structure

The FTB/RTB flight structure can be overlaid on all of the base’s squadron organizations. For example, an Airman in the force support squadron may work enlisted assignments day-to-day and report to the noncommissioned officer in charge of the assignments section but also be assigned to “Bravo Flight” in the FTB/RTB plan. His

or her noncommissioned officer in charge in the assignments section may also serve as the squad leader in the FTB/RTB structure. If a squadron doesn't fit neatly into the 44-person flight construct, then squads and fire teams can be tailored or combined with other units as required to meet local needs (fig. 2).

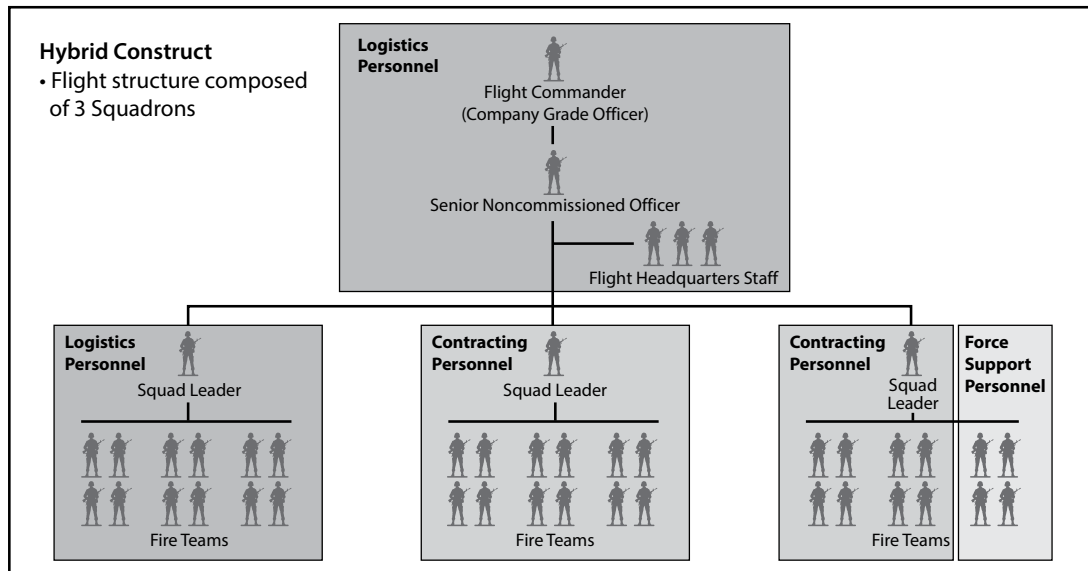


Figure 2. Hybrid flight structure

Under the FTB/RTB plan, all personnel are assigned “battle stations” within base defense or emergency response sectors around the installation. Battle stations associated with the FTB concept can be defensive fighting positions on the perimeter, working entry control points, or performing as part of mobile walking patrols. Battle stations should be permanently assigned for the duration of a tour so that Airmen become familiar with their assigned duties and area. For example, a small squadron such as contracting might be assigned solely to manning base-entry control points where, over time, they would become experts in that skill. Similarly, larger squadrons such as civil engineering or logistics readiness might be assigned dismounted patrolling duties throughout unpopulated or wooded areas of the base. Some specialties like aircraft maintenance or firefighters may be mission-essential in all conditions and man “battle stations in-place” (i.e., they perform their normal duties in emergency situations).

RTB builds off the FTB concept by supplying contingency-ready Airmen to augment base-recovery forces in the event of a natural disaster or other contingency. RTB organization and manning mirror the FTB structure, organized in the same squad format and thus taking advantage of the familiarity that squads have with



their battle stations and with each other's individual strengths. The base's civil engineer squadron acts as the focal point in all efforts to restore damaged facilities and infrastructure, including roadways, airfield surfaces, and utilities; it also supports civil authorities, providing them with any necessary equipment/personnel but only after the wing commander has approved this support. According to the amount and type of damage, that squadron determines the number of RTB forces required as well as where, when, and how they will be employed.

The difference between RTB and traditional base-recovery plans lies in the pre-identification of teams and their response sectors, as well as the training they receive prior to employment. Historically, bases form an unskilled manpower pool in reaction to a contingency. Organization occurs "on the fly," and base-recovery skills are learned as the contingency unfolds. The RTB concept organizes, trains, and equips Airmen to restore critical mission capabilities more expeditiously than do current methods. Trained RTB squads—manned and led by nonengineer Airmen—could be employed to accelerate the base-recovery process by clearing debris from streets, reporting damage to increase situational awareness and improve prioritization of recovery efforts, and even making minor repairs, such as shoring, boarding broken windows, and so forth. This same force could easily be employed in similar off-base situations should such a need arise, enabling the seamless interface with off-base emergency management organizations during scenarios involving military support to civilian authorities.

In both FTB and RTB, all Airmen are assigned rally points where they report automatically when the base alarm sounds or a recall message is sent out. These points should be close enough to work areas to facilitate a quick on-foot response if possible and be sized appropriately for the responding population. Central rally points can be used for multiple smaller squadrons if geography permits, while larger squadrons such as logistics readiness might need a rally point dedicated to that squadron. Once assembled at their respective rally points, Airmen will receive the appropriate equipment and any required instructions.

Concept of Operations

Under the FTB/RTB plan, all Airmen report to their normal work areas for day-to-day operations. In the event of an FTB recall, they would fall under the command of the defense force commander. Under an RTB scenario, Airmen would answer to the local base civil engineer. To facilitate the proper installation readiness levels, the construct includes four base defense postures that allow the base to prepare Airmen and resources to react to the identified threat. In response to elevated intelligence indicators or threat levels, these postures increase from normal to amber to orange and to red (fig. 3), each one directly increasing the number of Airmen and resources available for immediate base defense or response.¹⁸ When the FTB/RTB alarm sounds, Airmen respond automatically to their assigned rally points.

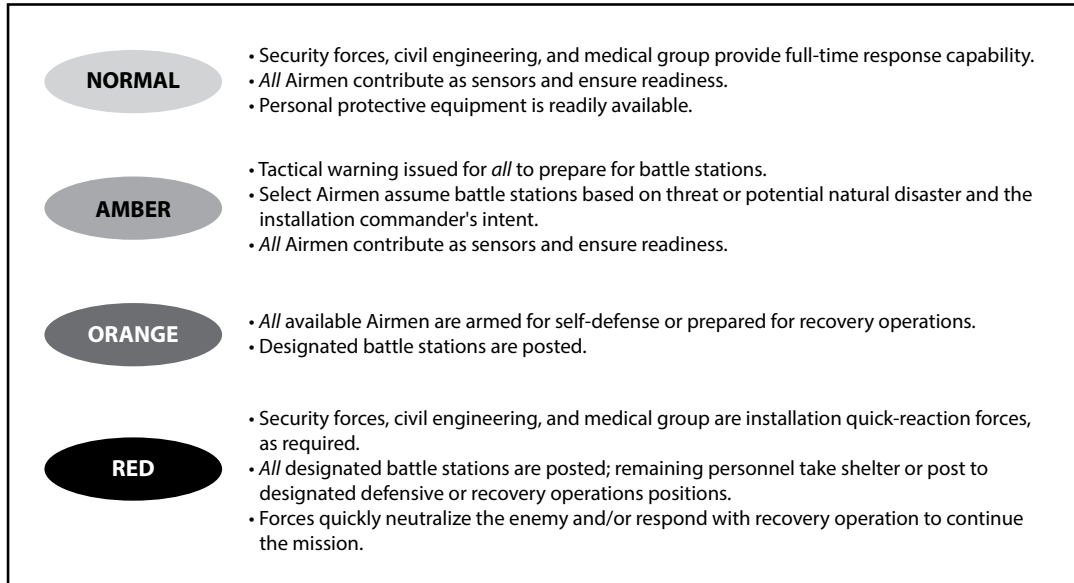


Figure 3. Force defense postures. (From briefing, Col Brad Spacy, commander, 375th Mission Support Group, subject: Installation Arming and Response: Fight the Base, Recover the Base, 17 April 2007, slide 10.)

At the rally point, Airmen form into their respective squads and flights, and unit leadership issues orders. Once assembled at their rally points, Airmen will receive the appropriate equipment and instructions. Those not immediately required are placed into a work/rest cycle (i.e., either they return to their normal duties or go home to rest and wait for their shift). As Airmen respond to their rally points under an FTB scenario, “mobile armories” simultaneously deploy from the logistic readiness squadron armory. Once armed, Airmen deploy to their predesignated battle stations.

The nature of RTB scenarios means that they may not merit an immediate response. Under RTB, the alarm may not sound until after the disaster has struck. For example, if a tornado hits a base, Airmen would not be recalled until after it has passed and the area is safe for a structured response. When directed, they would report to rally points just as they would under FTB but receive orders and equipment appropriate to help recover from the disaster. Once recovery operations are complete, Airmen would return to their normal work areas. Armed with these basic skill sets, the RTB squads present a ready, capable recovery force to assist the installation commander with both on- and off-base contingencies. Consider the impact of the tornado touching down on an Air Force base—roads blocked with debris and downed trees, facilities destroyed, flash flooding from torrential rain accompanying the storm, basewide power outages, fires and natural gas leaks, leaking fuel systems, and so forth. Such an event would quickly overwhelm engineers and would likely result in days and weeks of work just to restore basic services and reopen major roadways. Additionally, without basic services and clear access routes



throughout the base, most Airmen—with the exception of first responders and engineers—would likely remain idle.

The FTB/RTB construct applies equally to both garrison and deployed locations. The measured response provided by the force defense postures ensures that Airmen have adequate time to prepare for manning battle stations. However, in the event of a “no-notice” emergency such as an enemy attack, the defense posture could elevate immediately from normal to red. In an immediate response, Airmen would respond directly to their rally points upon notification.

Training

Training is a key component of both FTB and RTB plans but should not necessitate significant new funding. FTB training builds on ground-combat skills taught as part of predeployment requirements. Basic ground-combat skills should be enhanced with routine home-station training in practical “shoot, move, and communicate” skills such as basic rifle fighting, individual and team movement, hand and arm signals, and radio communications. Basic weapons-qualification training can also be reinforced through the use of a firearms training simulator present in most security forces squadrons. Routine use of the simulator not only enhances basic weapons skills but also increases Airmen’s confidence in weapons handling—experience not currently afforded under today’s “just-in-time” training format.

Similarly, RTB builds on the confidence gained in basic ground-combat skills training with a focus on specific equipment not normally included in predeployment training (i.e., heavy-equipment operations, debris clearance, flood control, damage assessment and reporting, and expedient repair methods). These skills can also be taught on any base with a civil engineering capability or through the use of virtual tools. Subject-matter experts will offer the remaining skill sets through hands-on training, including sandbagging techniques, chain saw and gas-powered blower operations, contingency vehicle training, expedient shelter erection, damage assessment and reporting, and command and control. These different training avenues allow RTB squad leaders a variety of alternatives and flexibility in ensuring that their Airmen receive the prerequisite skill sets. Taken as a whole, FTB/RTB training gives all Airmen added skills and confidence that are readily transferable to any environment.

Under this concept, the skills taught and used in garrison are the same as those required in a deployed environment, and the transition from peacetime to combat operations can become almost seamless. Initially these skills should be taught by subject-matter experts using standardized lesson plans coordinated with the appropriate functional community; however, over time as the FTB/RTB culture matures, all officers and noncommissioned officers should be able to teach these skills to their Airmen using available time in the work week. Routine base-level exercises should be combined with required emergency-response exercises and test the full spectrum of FTB/RTB plans.

Equipment

Equipment is another important component of executing the FTB/RTB plan. In addition to appropriate weapons and specialty equipment issued for a specific emergency response, all Airmen will be permanently issued a traditional “A-bag” of equipment normally associated with deployment. This bag should be kept readily available in their work areas, and Airmen would be accountable for routinely inventorying and maintaining equipment as necessary. Having equipment close at hand not only facilitates rapid transition to “battle stations” but also inculcates a “take care of your equipment and it will take care of you” philosophy critical in combat environments. In addition to the A-bag equipment common to all personnel, certain specialized equipment will be needed for RTB. Some of it, such as safety equipment, can be issued directly to the Airman, but other pieces, such as heavy-equipment vehicles, chainsaws, and tools, will have to be centrally controlled at the owning squadrons. Once this plan is implemented, when Airmen deploy to contingency locations, they will take with them equipment they have used and maintained routinely rather than a foreign bag of gear they seldom if ever touch before deployment processing.

Benefits and Opportunities

The benefits of FTB/RTB concepts extend far beyond the immediate improvement in installation emergency response. Fully developed and executed, FTB/RTB plans help build the “every Airman is a war fighter” culture by giving all Airmen a shared role and stake in fighting or recovering the air base as a coherent capability. This unifying role also helps break down functional stovepipes and increases teamwork and cooperation in all facets of base operations. Furthermore, combat skills taught routinely over time make Airmen more capable and enhance their confidence. Having more confident, multiskilled Airmen able to respond across the spectrum of emergency situations increases the Air Force’s ability to adjust more quickly to enemy attack plans and dramatically improve overall force agility and resiliency in both garrison and combat operational environments.

The Way Ahead

The draft version of Air Force Instruction 10-250, which provides the basis for fielding an Air Force-wide FTB/RTB capability, should be revived and implemented. The Air Force Installation and Mission Support Center, as the only Air Force organization with cross-functional representation and an enterprise-wide view of all installation and mission-support forces, should coordinate with functional representatives to develop appropriate tactics, techniques, and procedures for FTB/RTB plans. Additionally, a comprehensive review of the Air Force’s readiness training centers should be conducted to ensure that predeployment training experiences support and build on FTB/RTB skills taught at the home station. Furthermore, joint training and sister-service training opportunities should be evaluated. Professional military



education should be adjusted to support the FTB/RTB culture and “every Airman is a war fighter” philosophy. Finally, all Airmen should embrace the fact that they are the key in the Air Force’s ability to “Fight the Base, Recover the Base, and Win the War!” ☪

Notes

1. For the level II ground threat, see Air Force Handbook 31-109, *Integrated Defense in Expeditionary Environments*, 1 May 2013, 6–7, http://static.e-publishing.af.mil/production/1/af_a4_7/publication/afh31-109/afh31-109.pdf.

2. Department of the Navy, *Standard Organization and Regulations Manual* (Washington, DC: Office of the Chief of Naval Operations, July 2012), 6-118, 4-13.

3. *Ibid.*, 6-118.

4. *Ibid.*, 6-118–19.

5. *Ibid.*, 6-117.

6. Department of the Air Force, *Joint Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) Change Recommendation (DCR) for Integrated Defense* (Washington, DC: AF/A7S, April 2006), i.

7. *Ibid.*

8. *Ibid.*

9. Air Force Instruction (AFI) 10-250, “Installation Arming and Response” (draft), April 2006. Note that AFI 10-250 is now *Individual Medical Readiness*, 16 April 2014, http://static.e-publishing.af.mil/production/1/af_sg/publication/afi10-250/afi10-250.pdf.

10. US Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: Office of the Secretary of Defense, January 2012), http://archive.defense.gov/news/Defense_Strategic_Guidance.pdf. The quotation appears in the letter from the secretary of defense.

11. Joint Chiefs of Staff, *The National Military Strategy of the United States of America, 2015* (Washington, DC: Joint Chiefs of Staff, June 2015), i, http://www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf.

12. *Ibid.*, i; and Brig Gen Charles Flynn and Maj Joshua Richardson, “Joint Operational Access and the Global Response Force: Redefining Readiness,” *Military Review* 93, no. 4 (July–August 2013): 38–44, http://usacac.army.mil/CAC2/MilitaryReview/Archives/English/MilitaryReview_20130831_art001.pdf.

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14. Department of the Air Force, *America’s Air Force: A Call to the Future* (Washington, DC: Office of the Secretary of the Air Force, July 2014), 7, https://www.my.af.mil/gcss-af/USAF/AFP40/d/s6925EC1351870FB5E044080020E329A9/Files/editorial/AF_30_Year_Strategy_2.pdf.

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16. Department of the Air Force, *USAF Strategic Master Plan* (Washington, DC: Office of the Secretary of the Air Force, May 2015), 3, 47, http://www.af.mil/Portals/1/documents/Force%20Management/Strategic_Master_Plan.pdf?timestamp=1434024300378; and Department of the Air Force, *America’s Air Force*, 4.

17. Brig Gen Robert H. “Bob” Holmes et al., “The Air Force’s New Ground War: Ensuring Projection of Air and Space Power through Expeditionary Security Operations,” *Air and Space Power Journal* 20, no. 3 (Fall 2006): 41–52, <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/fal06/fal06.pdf>.

18. AFI 10-250, “Installation Arming and Response,” 2–3.



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Thinking beyond the Books

Sociological Biases of Our Military Institutions

Ben Zweibelson

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Professional military reading lists have expanded in recent years so that now nearly every senior organizational seat or position presents some recommended series of books or articles. As institutions, most militaries have reading lists for various groups and audiences as a means of fostering professional development and improving organizational knowledge. This article focuses on the American military (US Air Force and US Army) since that institution continues to exert significant international influence across the greater military profession. For the Air Force and Army, diverse reading lists tend to encourage positive narratives on academic development with subtle additional devices designed for nurturing a particular institutional legacy.

For militaries to be a profession, they require the continuous exchange of ideas and growth of new concepts, language, and emergent forms. Older, outdated, and unpopular ideas and language are discarded while some ideas retain important symbolic and institutionally self-relevant statuses that tend to cement them into our organization. Thus, every military library now possesses the familiar piles of books and a printed sheet listing the latest favorites for institutional consumption. But to what ends—and, more importantly, how—do we expect institutional development to occur beyond “reading books (and other media) deemed valuable to us”?

Any book list is potentially useful, but the value of a single book (or concepts within it) becomes a rather biased and frustrating process about which we might argue relentlessly on whether *On War* should be read by all commissioned lieutenants or perhaps how *Zen and the Art of Motorcycle Maintenance* ought to be reinserted into the required reading curriculum of the US Army’s School of Advanced Military Studies.¹ Instead of debating over this book or that, this article presents a broader discussion that looks above books entirely. We need to consider how the military as an overarching profession thinks (socially established ways of perception) and how we tend to practice self-referential maintenance of how we think by selecting certain types of books (as well as lists, videos, and other media) and excluding others. We exercise selective knowledge production, yet the deeper organizational reasons for which we do so often escape us.

To illustrate the implicit manner by which we often go about selecting reading lists, we examine the 2014 professional reading lists of the Army and Air Force chiefs of staff and frame the selections within a holistic and sociological approach that gives pause for reflecting upon our institutions.² We use these reading lists only because of their prominence within the established military hierarchy and the strong representation they offer to other associated and similar lists. Potentially, these annual American military reading lists may have no significant effect upon other militaries although more research is needed to explore that possibility. The 2015 and perhaps 2016 lists also came out during the publication timeline of this article, but they will undoubtedly follow the 2014 model and previous ones. We tend to repeat the same actions year after year, expecting different results.

Taking a sociological and at times abstract philosophical approach, this article finds that our book lists tell us more about how our Air Force and Army socially construct institutional perceptions of reality. Furthermore, some book lists might actively champion one singular way of thinking at the expense of all others.³ We essentially see an organization steering towards a single way of interpreting reality with all associated reading recommendations subjugated within that paradigm. For strategic thinking and critical institutional reflection, we first need to discuss the notion of paradigms and paradigm blindness. We must get “above the books” and think about rather abstract and implicit (invisible) forces within our organizations.

Burrell and Morgan: Paradigms Shaping Entire Social Frames for Reality

Had the Marx brothers wanted to dissuade academics from using the term *paradigm*, Groucho might have quipped, “Your paradigm’s worth 20 cents.” Acknowledging this notion up front, the term *paradigm* is both misunderstood and overused in modern military discussions. Yet, the importance of paradigms within sociology, philosophy, and science might be one of the most influential debates of the twentieth century—one that continues today. A paradigm is “the broadest unit of consensus within a science and serves to differentiate one scientific community from another. It subsumes, defines, and interrelates the exemplars, theories, methods and instruments that exist within it.”⁴ Although the more cited concepts of paradigms by Thomas Kuhn offer framing that tilts towards quantitative approaches, this article applies George Ritzer’s more sociologically inclined framing for paradigms.⁵

The article draws from the paradigm theories proposed by Gibson Burrell and Gareth Morgan since their sociological impact uniquely relates to organizational and social constructions of reality. Their four-paradigm heuristic construct also inspires the reading-list exploration as well as suggested solution frames.⁶ Their collective work and the efforts of recent organizational theorists work off variations of Burrell and Morgan’s original four-paradigm model established with the tensions among objectivity, subjectivity, stability, and radical transformation. Paradigms are inescapable—all humans use some sort of paradigm, and often groups or societies of humans share dominant paradigms that continuously reinforce their own particular (and exclusive) way of making sense of how the world is—and *ought to be*.

Using two tensions, figure 1 illustrates the dichotomy of these four concepts that create the quadrants in which paradigms reside. “Tensions” here is not a physics-based definition but the alternative (and squishier) sociological definition popularized in design applications such as Systemic Operational Design, US Army design theory, and US Special Operations Command approaches taught in the Joint Special Operations University.⁷ These tensions also illustrate ontological (what we decide our knowledge is and what it is not—the essence of what we think reality is) and epistemological (the “how” of producing our knowledge; the scope of our knowledge and apparent nature of formation) choices made at highly conceptual levels within each paradigm.⁸ Here, if one decides to understand reality with objectivism as well as stability, he or she will subsequently make sense quite differently than by selecting another paradigm with dissimilar ontological and epistemological choices.⁹ We just deny that interpretation of reality and move on with things. The interacting philosophical concepts of ontology and epistemology are significant in that they remain abstract yet profoundly overarching processes which subsume our socially constructed worlds. Societies, including military organizations, see past these choices insofar as they take them for granted, as *the way the world simply must always be*.

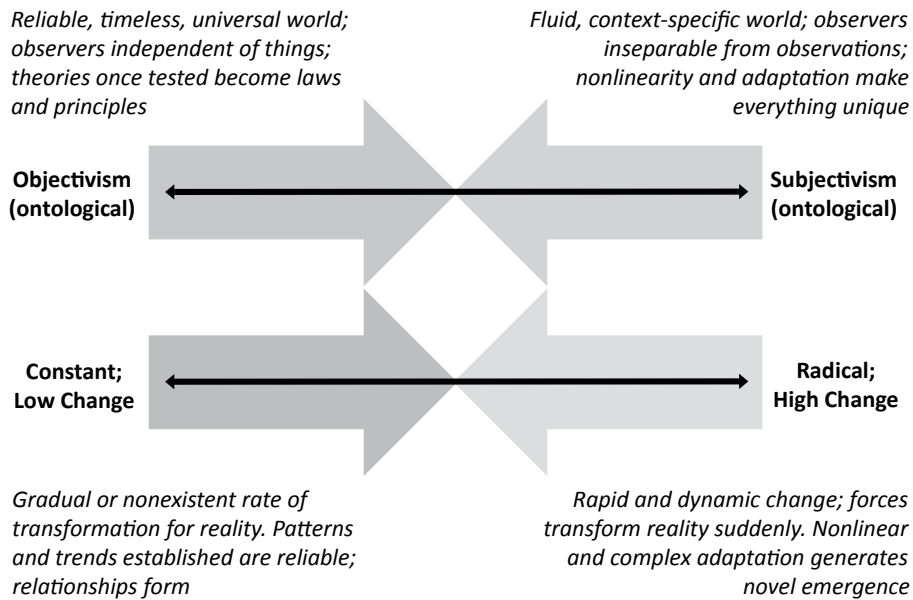


Figure 1. Tensions and paradox visualized with two lines

Figure 1 demonstrates the first dichotomy between objectivism (universal world removed from observers where testable theories become reliable laws) and subjectivism (fluid, context-specific reality where observers are part of the dynamic reality). For example, in a highly objectivist world, observers might experiment upon something in a laboratory, and their own actions are independent of the experiment. Like a watchmaker or mechanic, they might break down something complex, solve problems at a simpler level, and later reassemble the experiment into the larger whole. When considering if multiple “worlds” exist or simply one, readers are reminded that the Burrell and Morgan four-paradigm construct explained in figures 1 and 2 relies upon two important distinctions. Firstly, the social construction of reality subsumes that organization’s worldview so that there is only one world and that no alternative paradigms are valid. Secondly, many sociologists explore paradigm interplay (collaboration as well as friction or incommensurability between paradigms) when groups that espouse differing worldviews interact in complex reality.¹⁰

We tend to see quite a bit of objectivist approaches when military intelligence analysts produce solutions in which adversaries ought to be considered in universal, highly objectivist ways that exclude any hint of US cultural bias or error on behalf of the analyst.¹¹ The objective analyst sees no accidents, desires control, and assumes that over time one might gain greater understanding (and control) even of highly complex situations and environments via rigorous testing and data collection.¹²

Subjectivism works in tension with this highly objective ontology whereby an analyst might see control as an illusion and whereby gains in knowledge and experience also produce emergence in the environment; one simply cannot set foot in the same river twice.¹³ The fluid, subjective world is often perceived within studies of Eastern (or perhaps simply non-Western) societies.¹⁴ Many of the familiar Western (and implicitly universal) laws of war, principles, and timeless structures that operate on the objectivist side lose their value and bearing on the subjectivist side. There is extensive research in postmodernist as well as sociological disciplines on this topic although they are frequently a minority voice within traditional military professional education.¹⁵ Regardless, context matters for the subjectivist approaches, as do time and space, yet they matter in entirely different ways and purposes than the more familiar objectivist perspective.

The second dichotomy in figure 1 illustrates a tension between stability (consistency; reality remains predictable and more linear) and radical transformation (nonlinearity, emergence, and surprising adaptation). In a stable worldview, even over great periods of time and space, we observe a general consistency to reality. The stable perspective on war might see a pattern spanning most of human civilization in which, as Clausewitz argues, endless cycles of politics and war intertwine—much like ongoing duels at larger, state-centric scales.¹⁶ At the radical end of this tension, we might observe profound transformation over time and space, such as Michel Foucault's study of crime and punishment in human societies.¹⁷ As a post-modern philosopher, Foucault argues that Western civilization has moved from one form of penal system (the original violent and public spectacles of old) towards an institutional and more rehabilitative (as well as private) form. This gradual transformation permeates the human condition; thus, any social construction of reality changes with society at abstract and often tacit philosophical levels.

With these tensions, sociologists Burrell and Morgan first built their model of four dissimilar paradigms.¹⁸ This useful visualization forms an important second step for establishing different ways of viewing reality and organizing therein. Figure 2 modifies their original quadrant chart by using arrows from figure 1 to help visualize the ontological and epistemological forces afoot in each dissimilar paradigm. This approach also leads to a different way of looking at professional military reading lists.

Figure 2 depicts the four paradigms termed *functionalism*, *interpretivism*, *radical structuralism*, and *radical humanism*.¹⁹ Each of these paradigms is distinct, and we shall briefly outline them to establish necessary structure to this article's major arguments. Paradigms appear to many (but not all) theorists as constructs that do not play nicely with one another.²⁰ Of these four paradigms vying for dominance across multiple societies and organizations, functionalism is decidedly the "king" for Western societies and military organizations within. The four-paradigm framework is one of many ways of categorizing different worldviews for human civilization, but this article employs the Burrell and Morgan model as a useful cognitive framework for military professionals to consider.²¹

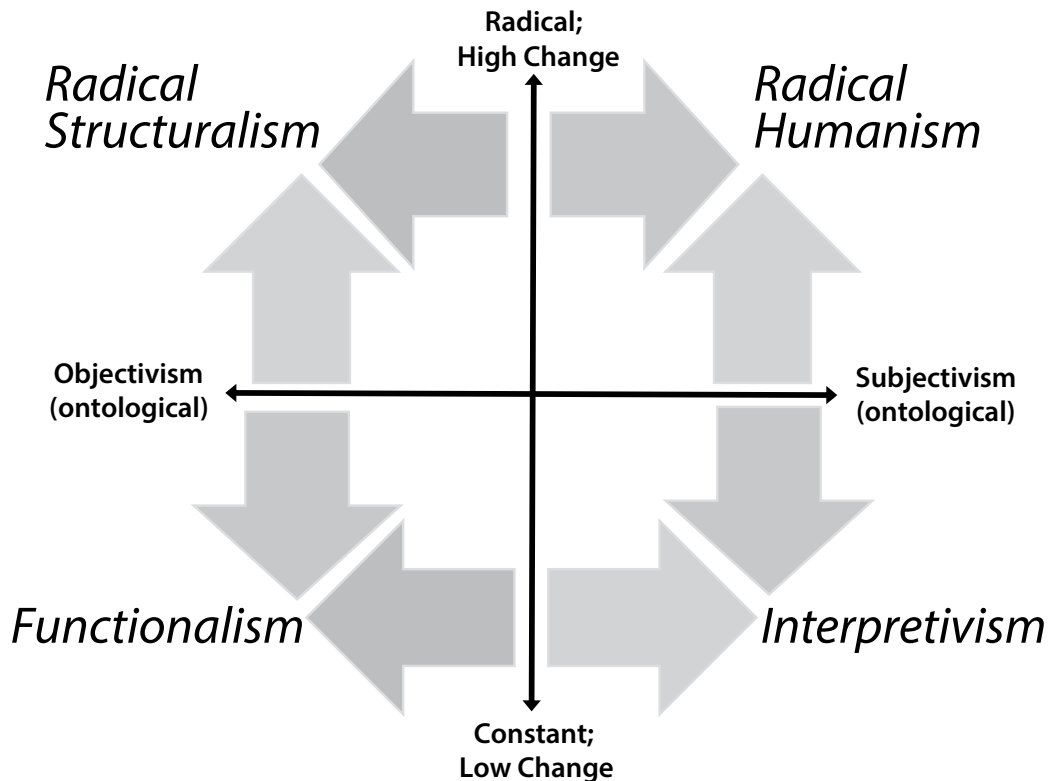


Figure 2. Variation on Burrell and Morgan’s quadrant chart of four paradigms

Functionalism denotes a single paradigm that interprets reality so that the world is systematic and reducible through scientific approaches, measurements, and repeatable linear processes. Once a “law” is verified, it becomes universal and timeless; the characteristics of a bullet’s trajectory remain constant anywhere in the world, now and eight centuries from today.²² Functionalist organizations dominate the landscape, with the accomplishments of NASA, almost all major corporations, and the vast majority of hard sciences embracing a functionalist outlook. Functionalism works exceedingly well in many situations but perhaps less so in complex environments.²³ Despite functionalism’s status as the dominant paradigm for many Western organizations (including all Western militaries), there are others to consider.²⁴

On the opposing end of functionalism resides “radical humanism,” involving subjectivity and radical change as ontological choices. Radical humanism seeks to free societies from overarching, dominant social structures and, through critical reflection, to help profoundly transform societies into novel, emergent forms.²⁵ Examples of radical humanist approaches occur in postmodernist philosophy as well as activist positions that apply tailored narratives to fluid, subjective environments.²⁶ Although few military applications of radical humanism exist, one finds several efforts

within small groups of military theorists.²⁷ Radical humanism is the polar opposite of functionalism within the Burrell and Morgan quadrant; thus, for most functionalist thinkers, the radical humanist camp seems almost unrecognizable. A subjectivist world where radical change is the norm means that nearly all of the functionalist cognitive tools become meaningless. Some postmodernist approaches thrive within this fluid uncertainty.

The other two paradigms are interpretivism and radical structuralism. The latter relates to radical humanism in the dynamic and nonlinear emergence for social change yet relates to functionalism in that radical structuralism takes the ontological position of objectivity.²⁸ Socialist movements and revolutions are often associated with radical structuralism in that Marx (Karl, not Groucho) and others associate radical transformation with universal and overarching political and economic forces.²⁹ Radical structuralism incorporates many of the “end of the world” scenarios found in literal interpretations of certain ideologies and thus has value in considering the motives of groups like the Islamic State. In profoundly dissimilar ways, socialists and radical Islamic terrorists become strange bedfellows within radical structuralism.³⁰

Interpretivism takes a dichotomizing stance against radical structuralism, seeing a fluid and subjective reality that also harbors stability and long-term meaningful social structuring.³¹ For interpretivists, people socially construct realities that can be explored through narratives, descriptions, and explanations which do not hold to analytical, linear, or scientific models. Sociologists such as Karl Weick and Donald Schon offer numerous examples of the interpretivist study of military organizations (aircraft carrier operations) as well as paramilitary ones such as smoke-jumping fire fighters.³² The interpretivist approach has some similarity to functionalism due to shared ontological positions on stability; thus, many “soft science” approaches in sociology, anthropology, and philosophy produce common ground for functionalist and interpretivist alike.³³

Burrell and Morgan's four paradigms present an important element for this article's framework for realizing why the military as a profession might posit most reading lists within one limiting paradigm. Paradigms seek to exclude the others and channel all comprehension and socialization of how reality works into processes that reinforce the one chosen paradigm as exclusive. Consequently, most of our institutions are unaware of and intellectually positioned to be hostile to any concept which operates beyond the carefully drawn boundaries that maintain that worldview.

To promote critical and creative design approaches, military professionals should first acknowledge and critically reflect on the dominant paradigms used to make sense of reality. We must avoid the cognitive trap of enforcing a single dominant paradigm and denying the relevance of the other three; instead, we should consider approaches in which multiple paradigms might influence a fusion of design ideas and approaches.³⁴ How we choose our books (as well as other media content) is not as interesting as *why we reject other books as “not worth the candle” to bother reading at all.*

Dominance of the Functionalist Worldview and Its Exclusive List of Military Books

Of the many military professional reading lists, we chose those of both the 2014 Army chief of staff and the Air Force chief of staff to illustrate the dominance of the functionalist strategic outlook as the preferred paradigm for the military profession.³⁵ This article does not challenge the books individually on these or any other professional reading list. However, it offers another way of framing them that promotes one paradigm dominating at the expense of other views. Clearly, all of these books are useful for members of the military profession to read. More interesting is how they all interrelate and how patterns of books might be left out.

Figure 3 illustrates where books from the Army reading list would appear, based upon the dominant paradigm employed by the author. Of the 26 books, I determined that only two of them were clearly from another paradigm (both interpretivism)—*Soldier's Heart* and *Managing the Unexpected*—both of which use interpretivist approaches instead of purely functionalist ones and therefore offer readers an alternative paradigm to consider. Two paradigms remain completely absent from the list. Granted, any categorization of a reading list into paradigm correspondence is itself a subjective task; books were considered in terms of whether they held to ontological choices that supported one or another tension outlined in figures 1 and 2. Readers may have strong objections to the classification of a particular book within the Burrell and Morgan construct but might appreciate the overarching approach and value of framing entire reading lists in this fashion. Just as we all might resist any overt criticism of a favorite movie or TV show, so are books frequently a hot topic for professionals with regard to which paradigm they most closely support.

Although another five books on the Army reading list have interpretivist leanings—*The Red Badge of Courage*, *The Starfish and the Spider*, *The Art of War*, *The World Is Flat*, and *On War*—they still are either used by the majority of our military profession in a functionalist mind-set or have only elements of interpretivism with a majority of content geared towards functionalism. In some situations, these books contain enough subjectivist constructs that military readers may explore well outside the dominant functionalist paradigm. However, books like *The Red Badge of Courage* and *The Art of War* can be applied (or misapplied) in either an interpretivist or a purely functionalist mind-set, depending upon the reader and organizational tendencies. As the Western overarching military tilts decidedly functionalist, one may assume that these “interpretivist leaning” books are more often than not forced into largely functionalist interpretations. For instance, when military professionals attempt to establish rules and “principles of warfare” cast within the interpretivist writings in *The Art of War*, we see the functionalist dominant paradigm in action.

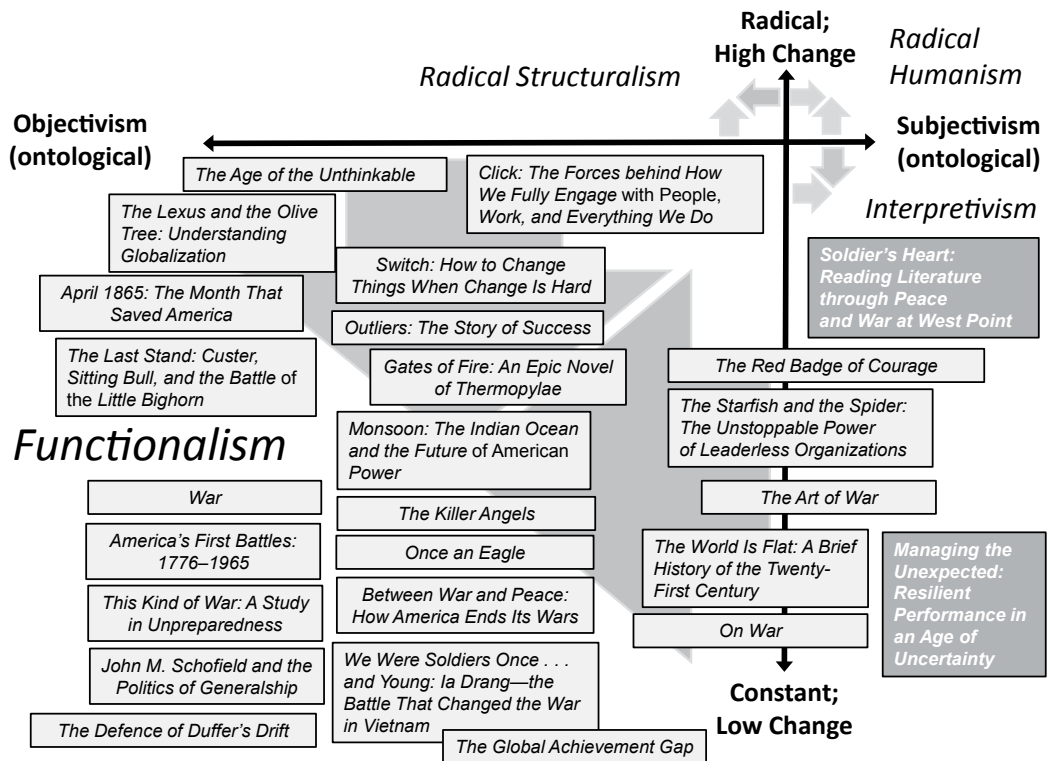


Figure 3. Army chief of staff's 2014 reading list and the dominance of functionalism

Although a controversial position worthy of an article itself, we suggest that Carl von Clausewitz's seminal work about war theory, *On War*, is largely applied (*perhaps misapplied*) by most military theorists in a largely functionalist approach (principles of war, laws, trinities, and objective stability wherein patterns emerge in conflict).³⁶ Whether a select few do apply Clausewitz within other paradigms does not override the vast majority of military professionals who interpret the work within a purely functionalist strategic outlook. When it comes to *On War*, most of the institution seeks some sort of acontextual and ahistorical framework upon which to ponder all wars, regardless of time and space. Napoleon did some things while Patton did others, but one might use the war philosophy contained in *On War* to establish overarching patterns that subsequently make for important chapter quotations within modern military doctrine. Without Clausewitz, doctrine writers might need to heavily edit existing products.³⁷

Furthermore, this article does not ignore the paradox that in order for us to determine the paradigmatic origins of any book list, we have to employ what is largely a functionalist metric to categorize and evaluate. Using a quadrant model with highly analytical plotting is visually and cognitively the most effective manner to convey a nonfunctionalist idea to a military audience that largely adheres to a functionalist paradigm. Lastly, before the hand wringing begins on how books that seem to have

“radical change” phrasing in their titles or thesis were still placed inside the functionalist paradigm, we wish to remind readers that functionalism indeed has emergence, nonlinearity, decentralization, swarm, and complexity theory (for those books that address these topics yet remain decidedly functionalist). The epistemological choices that functionalism makes on the nature of reality are critical here.

Functionalism sees contextual change within stable, overarching, governable processes; or as individuals we can move anywhere on the planet without worrying about gravity suddenly transforming tomorrow into something new.³⁸ Gravity remains constant; we are free to move about the planet. This principle works exceedingly well for simplistic, closed, and even complicated systems. Human societies, however, do not fall within such neat systematic approaches.³⁹ Continued efforts to channel society into a functionalist worldview can be traced across far too many books on the Army reading list.

The Army chief of staff's reading list for 2014 is not to be outdone in the single-paradigm dominance. This article also examines the Air Force chief of staff's list for the same year, which includes 12 books (fig. 4).⁴⁰ In an example of complete paradigmatic dominance, all of these books fall firmly within a functionalist paradigm for topic, approach, and the author's ontological and epistemological choices to construct reality in an objective and low-change organization. Again, this statement is not criticism of any of these 12 excellent books for military professionals; rather, it is a charge leveled at the holistic and interrelated justification of a single paradigmatic dominance that guides the Air Force profession in one direction. This is about *thinking about how we think and why*.

We do not discount either the content or logic of these authors but simply point out that all of the 12 books presented rely on the same functionalist paradigm for interpreting reality. Even authors of sociological topics such as *Crucial Conversations* and *Sticking Points* used a quantitative, measured, and step-by-step model of how readers can improve organizations and engagements. One paradigm is not “better” than another, nor is any single book inferior just because it relies upon one paradigm. Nevertheless, when we holistically think about entire reading lists for our military organizations, is it useful for functionalism to dominate so pervasively? Does this dominance inhibit our thinking about our thinking? Can we truly be critically reflective and creative if we use just one approach to sensemaking about reality? Can a reading list consider things *from a transdisciplinary manner* that considers multiple paradigms?⁴¹

Figures 3 and 4 represent the dominant functionalist paradigm and the way the Army and Air Force as a larger collective military profession tend to determine what they will perceive about reality: “A system perceives those things that will enable it to maintain its organization (i.e., its identity).”⁴² Granted, some people may object to the categorization of one particular book or another into a paradigm they violently disagree with, but what about the preponderance of books in these two groups? Can one excuse such a large degree of functionalist-minded readings? For design approaches, how might our military develop a transdisciplinary approach to perceiving things in different ways? By “transdisciplinary,” we mean that one might move up and out of one's own preferred paradigm, appreciate other paradigms, and navigate between them to develop interactions, overlap, tensions, and interplay.⁴³

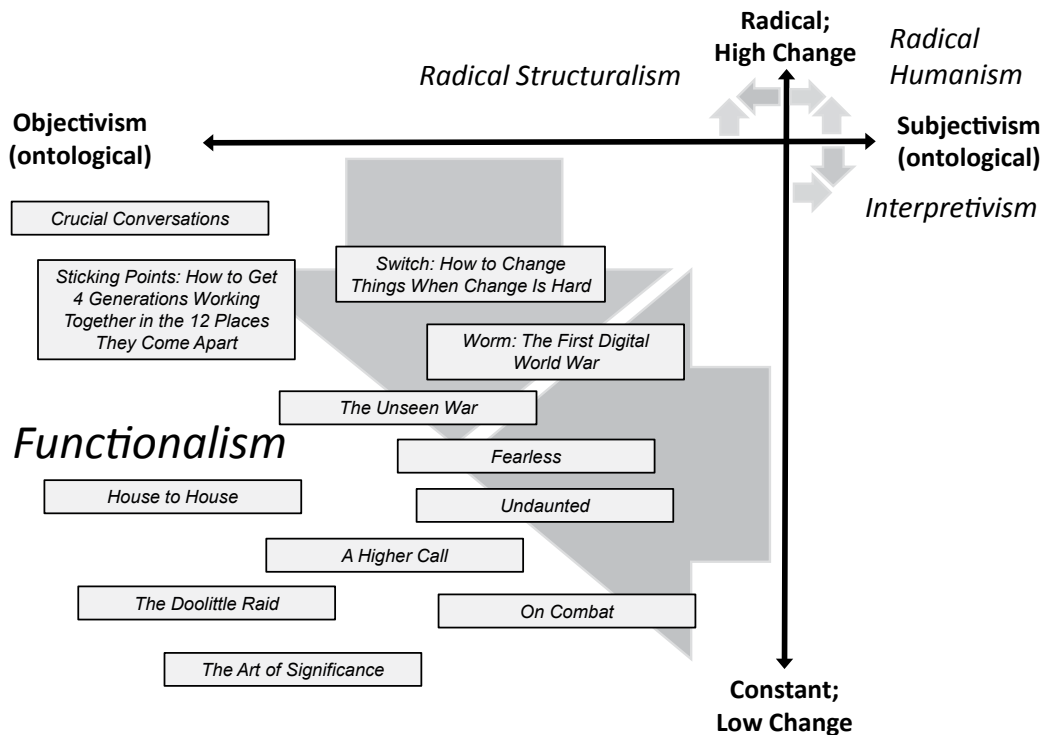


Figure 4. Air Force chief of staff's 2014 reading list and the dominance of functionalism

Can our Air Force and Army broaden our reading lists to include paradoxical, incommensurate, and possibly radically dissimilar perspectives on the same things? Does such an effort even matter if perhaps getting an organization to maintain control and universal reliability is paramount to creative and critical adaptation? The modern uncertain and complex conflict environments seem to summarily reject conventional, traditional, and centralized hierarchical approaches. Acknowledging that “doing things in ways that showed success in the past” is no longer a viable model for projecting future organizational development, we need to reconsider how and why we think the way we think. Challenging our preference of a single dominant paradigm (paradigm blindness) will open up reading opportunities in other paradigms, promoting creativity and organizational growth.

Some problems associated with any approach to a multiparadigm reading list exceed the scope of this article and would be a useful topic of further investigation. Firstly, it is unknown whether any multiple paradigm configuration of reading lists has any positive effect upon a military organization. The baseline for any future research rests on the fact that most existing professional military reading lists appear to have strong functionalism leanings. Secondly, because functionalism is “king” of the paradigms, not very many articles, books, or other materials are available in other paradigms as potential food for future lists. In the case of the Air Force and

the reoccurring methodology of retiring books after they appear once on an annual list, any effort to place several radical humanist readings might quickly run out of options. Thirdly, although this article offers next an “ideally balanced paradigm reading list,” this option is likely unrealistic and difficult to manage. Further sociological research might explore whether some other ratio such as a 60 percent functionalist, 40 percent nonfunctionalist reading list works best—or some other composition. For this article, the only solid position arguable at this point is that a reading list with only one paradigm dominating the perspectives may be of less value than a list with greater inclusion of alternative paradigms.

Other Books That Provide a Multiparadigmatic Chorus

To demonstrate a multiparadigmatic approach to constructing reading lists for the military profession, this article supplies a framework with some potential candidates. These suggestions do not imply individual “book versus book” superiority to any other military reading lists; however, we argue that any list which balances among the four paradigms instead of just one has greater potential for organizational development, critical reflection, and creative innovation beyond the first order of understanding (single paradigm thinking).⁴⁴ Individuals guilty of first-order understanding categorically deny the relevance of alternative paradigms or end up talking past the other perspective in an incommensurate fashion.⁴⁵

The books recommended below are merely alternative paradigmatic examples that can easily be swapped out with other books, provided that the final reading list does not again descend into single paradigm dominance. In fact nearly any other book might work instead as long as the reading list composer first considers the origin paradigm of the works. Should some suggested books seem too “out there” or perhaps not worth the time for the organization to read, certainly a professional might find other books that simply operate from a nonfunctionalist outlook. One might make 1,000 different reading lists for the profession, yet as a learning organization we might value those that are balanced to represent four paradigms instead of one. In this way, an organization develops and perhaps stops trying to apply the same old solutions that no longer work to complex adaptive problem sets.

Military Readings with Radical Humanism

Radical humanism is perhaps the most divergent from functionalism and therefore one of the most challenging positions to start with. Books using a radical humanist approach tend to be rather unlike most military-friendly concepts, using a variety of subjective, conceptual, and highly transformative processes devoid of familiar functionalist language, analysis, and quantitative logic.⁴⁶ Examples of radical humanist approaches occur in postmodernist philosophy as well as activist positions that apply tailored narratives to fluid, subjective environments. Regardless, many of these books offer novel and profoundly different ways for military professionals to consider reality, military complexity, and thinking about how we think. This prospect can be rather unsettling for devout functionalists, in much the same way that poetry might swiftly be rejected within the traditional science lab.⁴⁷ Military professionals

need to be warned that of all the alternative paradigms, radical humanism is in strongest ontological and epistemological tension with functionalism; thus, these books and the concepts presented within are perhaps the most problematic to consider on many cognitive, linguistic, and structural levels. Or, for most functionalists, the radical humanist reading list is potentially the most offensive. Before ignoring or disregarding alternative outlooks outright because of professed paradigm bias, professionals might give some time and energy to these selections.

1. Jean Baudrillard, *Simulacra and Simulation*, translated by Sheila Faria Glaser.⁴⁸ This postmodern radical humanist book confronts how reality is socially constructed, maintaining that our society creates illusions that displace reality while confusing us. It forms the conceptual foundation for the popular *Matrix* science fiction trilogy and offers military professionals a novel way to explore how institutions define themselves as well as reality itself. The movie complements the book insofar as reading it provides deeper insight into the films.⁴⁹
2. Jacques Rancière, *The Ignorant Schoolmaster*, translated by Kristin Ross.⁵⁰ Another French postmodernist approach within radical humanism, *The Ignorant Schoolmaster* tells the story of French educator Joseph Jacotot, who challenged European pedagogy in the early nineteenth century by teaching students in an unconventional way (i.e., he did not know the subjects they were learning). Military professionals can explore entirely dissimilar ways of security force assistance, unconventional warfare, and the entire military professional education system through Rancière's presentation of Jacotot.⁵¹
3. Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, translated by Brian Massumi.⁵² Arguably a most difficult and confusing read for people unfamiliar with postmodernist language and narrative structure, Deleuze and Guattari's 12th chapter, "The War Machine," is most applicable here for a largely radical humanist approach. The authors were inspired by Nietzsche's philosophy and make some critical points on the nature of warfare, society, humanity, and change. For this work, a compendium or additional sources are highly recommended.
4. Chuck Palahniuk, *Fight Club*.⁵³ Unlike the French postmodernism found in the first three suggestions, *Fight Club* is an exciting work of fiction. Just as Baudrillard's work became *The Matrix*, so was Palahniuk's novel made into a movie with the same title. *Fight Club* presents several themes, one of them presenting much of the radical humanist desire to dismantle the socially constructed world and free humanity from the shackles of capitalism, hierarchical organization, and modern society.

Military Readings with Radical Structuralism

Radical structuralism shares with functionalism the ontological decision that reality is largely objective, whereby forces and processes once defined and confirmed can be relied upon across time and space. However, radical structuralism deviates from functionalism in that radical change and nonlinear transformation occur. Radical

structuralism is often associated with Marxism (the Socialist movement instead of the Comedy Troupe), but one can argue that other approaches which espouse an “end of the world” prediction (eschatology) within human society share many forms and functions within the radical structuralist paradigm. Thus, the Islamic State becomes a possible example within radical structuralism, albeit for different reasons than those of Marxist groups. One foresees a utopia where workers of the world unite and defeat capitalism while another envisions an ideological paradise cast upon Armageddon. The following books provide valid sources for military professionals to consider.

1. Qiao Liang and Wang Xiangsui, *Unrestricted Warfare*.⁵⁴ Liang and Xiangsui serve up a decidedly non-Western approach to interpreting American foreign policy and military strategy. Radical structuralism is not equal to non-Western; however, these authors do apply multiple radical structuralist ontological choices on their view of warfare that convey several eschatological outcomes for technology, war theory, conflict, and human societies. In the situation that the US Air Force has used this work (and may have retired it from future lists), it opens the discussion to whether in low-volume sources within nonfunctionalist paradigms, some titles might have utility reappearing in subsequent annual lists.
2. Anatol Rapoport, “Editor’s Introduction to *On War*,” in Carl von Clausewitz’s *On War*.⁵⁵ In this introduction to the 1968 Penguin Books edition, Rapoport puts forth a decidedly radical structuralist contrast to the bulk of Clausewitz’s strategy of war. The editor offers a variety of worldviews for radical structuralists that might feature ideological or political positions that break from the functionalist perspective on human conflict. Reading the rest of *On War* after his introduction offers military professionals another way of critically and creatively reflecting upon Clausewitz with both a functionalist and a radical structuralist paradigm.
3. Raphael Patai, *The Arab Mind*.⁵⁶ Although this is a controversial book when misused within a purely functionalist methodology, military scholars can gain valuable insight into Israeli researcher Patai’s approach. He uses elements of radical structuralism towards assigning “national character” forces that generalize entire societies and embrace objectivist ontologies on how the Arab society functions. Readers can apply multiparadigmatic concepts to this book as well as the author in order to appreciate radical structuralism.
4. Sayyid Qutb, *Ma’alim fi al-Tariq (Milestones along the Way)*.⁵⁷ Written in prison by Qutb and later used to sentence him to execution by the Egyptian government, *Milestones* is a powerful Islamic example of radical structuralism. Qutb provides a linear narrative for instructing Islamic society to radically transform from what he views as a broken or extinct path into an ideologically mandated perfect society where tyranny is eliminated and the world exists only in a freed Islamic-based existence. Qutb’s work parallels nonideological socialist writings and shares with them the radical structuralist paradigm.

Military Readings with Interpretivism

Interpretivism offers the shared epistemological decision that functionalism has where reality remains consistent, but interpretivism makes sense of the world through a highly subjective lens that rejects analytical, quantitative processes. Interpretivists see the world as fluid—one in which qualitative trumps quantitative and the observer must be included within the observations. Thus, a scientific approach involving attempts to remove the scientist from the equation is not possible within interpretivism, nor can analytical logic form anything predictive or static. Heraclitus's maxim of "never being able to step in the same river twice" sums up how interpretivist subjectivity stands in stark contrast to functionalism's objectivity.⁵⁸ Time becomes both irreversible and "a constitutive element in the formative processes of things and not simply a convenient parameter."⁵⁹ Subjectivity requires personal experience and meaning to dominate over objectivist fixations on universal truths and testable hypotheses. Interpretivists act to "un-name, decontextualize, blur shapes, drop forms, clear the imagination, accept the airy nothing, and reimagine the flux, *slowly*, back toward shapes, local habitations and names" (emphasis in original).⁶⁰ This sort of approach tends to turn away functionalists seeking the objectivity of acontextual and ahistorical processes that support hard science and a stable worldview.

1. Hayden White, *The Content of the Form: Narrative Discourse and Historical Representation*.⁶¹ White supplies an interpretivist approach to how societies construct narratives and stories, as well as how they convey knowledge. He explores the construction of history by societies and goes deeply into the notion of time, space, context, meaning, symbols, and cognition.
2. Peter Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*.⁶² The authors offer an interpretivist perspective on how societies construct, share, and defend knowledge against rival factions and dissimilar societies.
3. Paul Ricoeur, *Time and Narrative*, translated by Kathleen McLaughlin.⁶³ Ricoeur leads a deep interpretivist journey into the meaning of language, symbols, and human understanding, where "language is oriented beyond itself. It says something *about* something" (emphasis in original).⁶⁴ Societies construct elaborate systems of signs that operate implicitly around us.

Military Readings with Functionalism Reduced

Although any of the predominantly functionalist books within the 26 books offered earlier in the Army chief of staff's reading list are suitable within a functionalist perspective, this article instead offers the following, which pair well with the other paradigms and suggested readings. Many of these books seem to have very little to do with the military profession; however, the subject matter should not be a limiting factor if we are discussing an ontologically neutral approach to military professional development. Otherwise, piling books on military history, military fiction, and military leadership could suffice for any reading list. In other words, suppose

we lock five military history professors in a room and try to get them to agree on a reading list for any given military conflict. Stark opinions would most definitely occur, for good reason. Creativity often works best when the thinker is unshackled from the standard and often repetitive structure; forcing readers to move away from purely military subjects can trigger avalanches of military ideas and reflections. Any of these books might be replaced with suitable others, *provided that the entire reading list appreciate a transdisciplinary representation.*

1. Douglas Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid*.⁶⁵ The author blends mathematics, artificial intelligence theory, music, art, and narratives to formulate his arguments on complexity, human cognition, and the way we understand reality. This Pulitzer prize winner is lengthy and contains advanced mathematics that Hofstadter instructs nonmathematicians to skip while he leads off each chapter with a clever vignette that employs metaphor to convey deep concepts.
2. Nassim Taleb, *The Black Swan*.⁶⁶ Taleb's work employs an elegant yet easy-to-read approach to complexity theory. The author uses regular activities and examples from the real world to convey his concepts, including how bell curves and other predictive models fail in complex adaptive environments. Taleb's other works, such as *Antifragile*, are applicable here as well although *The Black Swan* may offer the best of a functionalist approach. Since his works have been on earlier Air Force reading lists, the chief might substitute yet another book that looks at complexity theory, such as Haridimos Tsoukas's *Complex Knowledge: Studies in Organizational Epistemology* or Antoine Bousquet's *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity*.⁶⁷
3. Carl Builder, *The Masks of War: American Military Styles in Strategy and Analysis*.⁶⁸ Builder completed this study of American military services for RAND in 1989, brilliantly analyzing the overarching narratives and the collective socially constructed realities that each service generates. He suggests that a service draw from powerful historical narratives in order to continue self-relevant actions and compete, even against national interests, for future military relevance in conflicts.

Conclusion

Military reading lists continue to adapt and change as our profession develops new ideas and discards irrelevant or dysfunctional ones. Although most lists tend to deliver a single paradigm position that prevents comprehensive understanding across multiple paradigms, this article has presented solutions to paradigm blindness by employing a transdisciplinary approach. Figure 5 aligns 14 suggested books within their associated paradigm although any one of them is not nearly as important as the paradigm balancing across all of them holistically. Any of these books can be substituted for others, provided that the complete list shows valid voices and ideas from across dissimilar and potentially incommensurate paradigms. These are

merely 14 of countless others available. Perhaps an organization needs a majority within one paradigm over the others, yet any reading list becomes suspect when only one paradigm dominates in a pervasive and implicit manner.

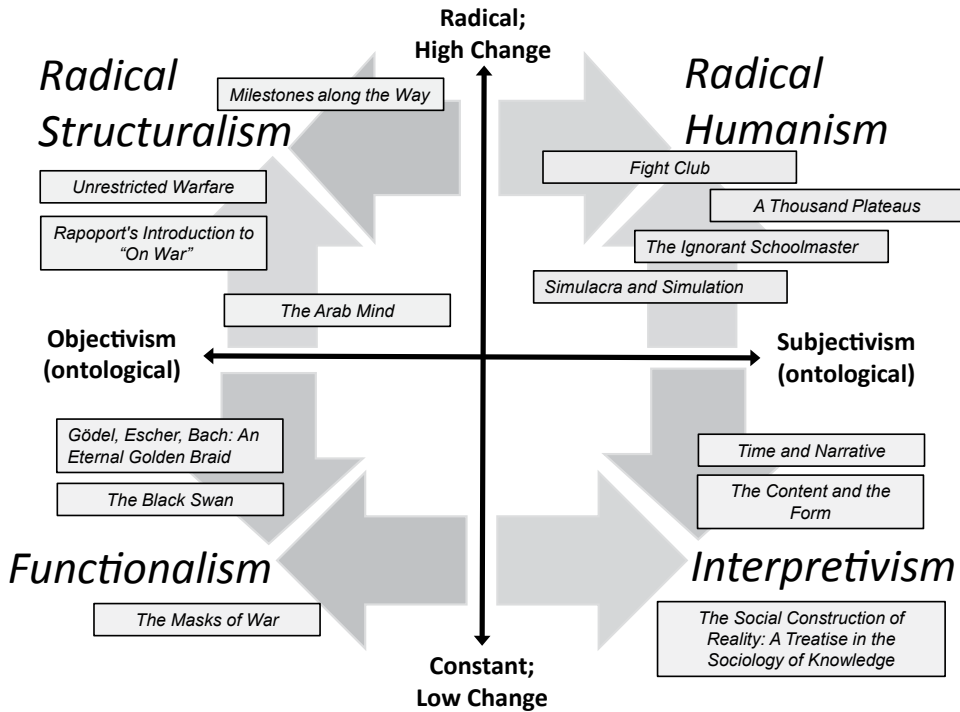


Figure 5. Designing suggested books across all paradigms

Figure 5 presents one way to approach military professional reading lists whereby our first concern is not on the individual books but on the overarching paradigm awareness. We are not only thinking about the books *but also thinking about thinking about our books*. Balance across multiple paradigms gives us the sort of intellectual well-roundedness and curiosity that our military organizations require in complex adaptive environments. Traditional single-paradigm reading lists no longer work; we simply cannot continue to reinforce such a limited worldview while insisting that our forces are capable of creativity and innovation that a single paradigm prohibits. Figure 5 may be an idealized approach with equal balance across each paradigm for consideration of a professional reading list. As discussed earlier, further research is necessary for sociologists to study whether some other ratio of book-to-paradigm structure provides additional benefit to military professional development over time. Figure 6 presents several hypothetical alternate reading list ratios that a military service might consider in the absence of sociological inquiry. Again, the one significant charge made in this article is that any ratio may have potential while any reading list with a vast majority of reading suggestions

mired in a single paradigm likely presents a myopic approach to complexity and warfare. With US military forces shifting to “human domain” and “gray zone” concepts in 2015–16, complexity is moving towards the forefront of our gaze. Our reading lists should follow suit.

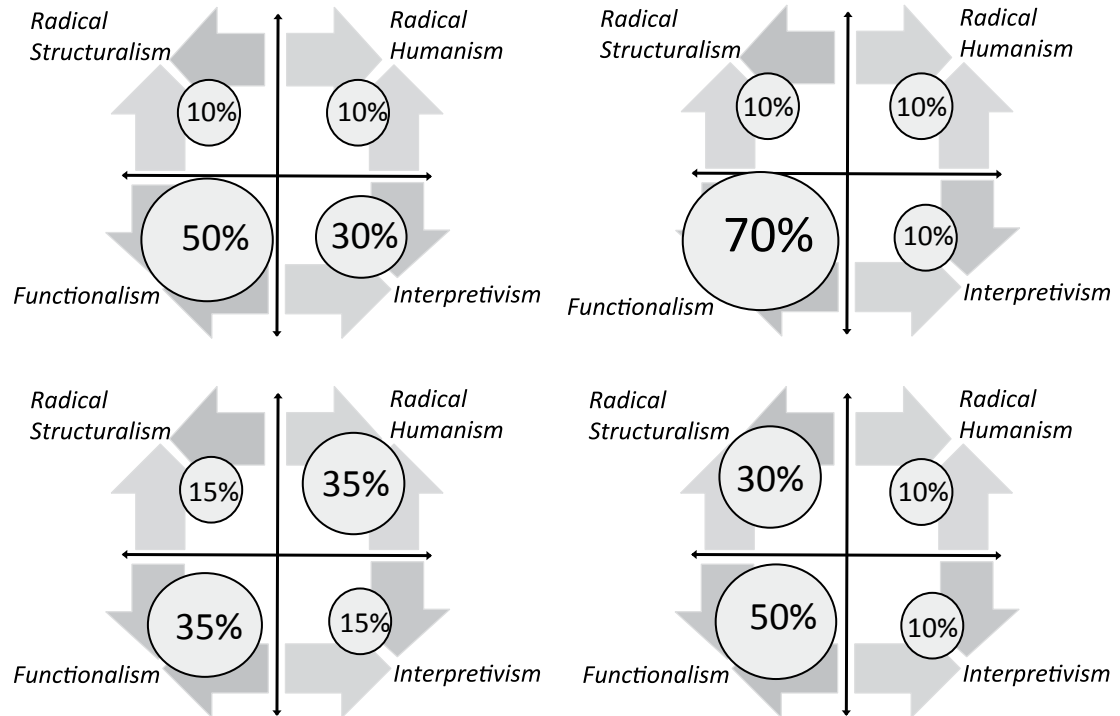


Figure 6. Hypothetical reading ratios for further sociological study

Other professions might advance through single paradigm approaches, but the military struggles with what functionalists define as “the human domain” because human societies are complex (and, paradoxically, resist being fractured into “domains”).⁶⁹ We may live in a world where scientists can indeed measure beams of light, engineers can assemble and disassemble complicated engines, and doctors can perform precise brain surgery, but all of these humans interact in uncertain and adaptive ways. If any profession needs to spread its cognitive wings and break out of paradigm blindness, the military does. Ours is the only profession that attempts to balance security with governmental coordination, confronting aggressors and the complexities of human societies while scientists, engineers, and brain surgeons go about the business of life within these uncertain environments. In the twenty-first century, our profession first and foremost concerns itself with understanding multiple ways of perceiving reality so that we apply lives and resources in the most productive ways imaginable instead of rather unimaginatively. To guide our military organizations towards adapting novel strategy, designing creative and

critical concepts, and appreciating emergent complexity in uncertain conflict environments, we need to read from more than a single paradigm. ✪

Notes

1. Timothy Challans, "Military Review Classics Revisited," review of *Zen and the Art of Motorcycle Maintenance*, by Robert Pirsig, *Military Review*, March–April 2009, 128.

2. Valerie Ahl and T. F. H. Allen, *Hierarchy Theory: A Vision, Vocabulary, and Epistemology* (New York: Columbia University Press, 1996), 18. To think about thinking implies "metacognition"—focusing on the "why" of thinking instead of the "what." See also Karl Weick, "The Role of Imagination in the Organizing of Knowledge," *European Journal of Information Systems* 15 (2006): 448–51; and Haridimos Tsoukas and Robert Chia, "On Organizational Becoming: Rethinking Organizational Change," *Organization Science* 13 (2002): 571.

3. Gibson Burrell and Gareth Morgan, *Sociological Paradigms and Organisational Analysis* (London: Heinemann, 1979); and Dennis Gioia and Evelyn Pitre, "Multiparadigm Perspectives on Theory Building," *Academy of Management Review* 15, no. 4 (1990): 584–86. See also Gary Weaver and Dennis Gioia, "Paradigms Lost: Incommensurability vs. Structuralist Inquiry," *Organization Studies* 15, no. 4 (1994): 567–69; Colin Clarke-Hill, Huaning Li, and Barry Davies, "The Paradox of Co-operation and Competition in Strategic Alliances: Towards a Multi-paradigm Approach," *Management Research News* 26, no. 1 (2003): 1–20; Aaron Jackson, "Innovative within the Paradigm: The Australian Defence Force's Reinvigoration of Joint Operational Art," n.d. (unpublished draft provided by author in personal correspondence, University of New South Wales); and Thomas Kuhn, *The Structure of Scientific Revolutions*, 3rd ed. (Chicago: University of Chicago Press, 1996), 147–50. Kuhn posits that paradigms are incommensurate (although within a largely quantitative approach as compared to Ritzer, Burrell, Morgan, Pitre, Gioia, and other sociologists cited in this article). Here, we make ontological choices associated with the paradigms of functionalism and interpretivism to isolate objectivity and subjectivity.

4. George Ritzer, *Sociology: A Multiple Paradigm Science*, rev. ed. (Boston: Allyn and Bacon, 1980), 7. See also Kuhn, *Structure of Scientific Revolutions*, 5–15.

5. The sociological direction of Ritzer is best illustrated in *Sociology: A Multiple Paradigm Science*; and "Professionalization, Bureaucratization and Rationalization: The Views of Max Weber," *Social Forces* 53, no. 4 (1975): 627–34. Kuhn, however, takes a "philosophy of science" direction that Ritzer differs from. See *Structure of Scientific Revolutions*. The other sociologists cited in this article tend to move closer to the sociological aspects of Ritzer on paradigms. See also Burrell and Morgan, *Sociological Paradigms and Organisational Analysis*; Gareth Morgan, "Exploring Plato's Cave: Organizations as Psychic Prisons," in *Images of Organizations* (San Francisco: Sage Publications, 2006), 520; Morgan, *Images as Organizations* (Oakland, CA: Berrett-Kohler Publishers, 1998); Gioia and Pitre, "Multiparadigm Perspectives," 584–602; Weaver and Gioia, "Paradigms Lost," 565–90; and Christopher Papparoni, *The Sociology of Military Science: Prospects for Postinstitutional Military Design* (New York: Bloomsbury Academic Publishing, 2013), 161–79.

6. Burrell and Morgan, *Sociological Paradigms and Organizational Analysis*; Gioia and Pitre, "Multiparadigm Perspectives," 584–86; and Weaver and Gioia, "Paradigms Lost," 567–69.

7. The author consulted US Special Operations Command's (USSOCOM) Joint Special Operations University (JSOU) in 2015 to help establish and subsequently instruct in its Design Theory for Practitioners course as well as other design efforts. The author researched Israeli Systemic Operational Design (SOD) in 2010 during a stay at the US Army School of Advanced Military Studies where students also learned Army design theory (now Army design methodology). SOD research involved multiple personal interviews with the founder of SOD, retired Israeli brigadier general Shimon Naveh in 2010–11. All of these approaches formally or informally use this sociological definition of "tension."

8. Majken Schultz and Mary Jo Hatch, "Living with Multiple Paradigms: The Case of Paradigm Interplay in Organizational Culture Studies," *Academy of Management Review* 21, no. 2 (April 1996): 530–33. See also Marianne Lewis and Mihaela Kelemen, "Multiparadigm Inquiry: Exploring Organizational Pluralism and Paradox," *Human Relations* 55, no. 2 (2002): 252; and Marianne Lewis and Andrew Grimes, "Metatriangulation: Building Theory from Multiple Paradigms," *Academy of Management Review* 21, no. 4 (October 1999): 673–75.

9. Burrell and Morgan, *Sociological Paradigms and Organisational Analysis*; Robert Cooper and Gibson Burrell, "Modernism, Postmodernism and Organizational Analysis: An Introduction," *Organization Studies* 9, no. 1 (1988): 91–112; Lewis and Grimes, "Metatriangulation," 672–90; and Gioia and Pitre, "Multiparadigm Perspectives," 584–602. Each of these sociologists explores variations on the Burrell and Morgan "four paradigm" heuristic aid. Clearly, there are alternative manners to define, explore, and explain paradigms that exceed the scope of this article.

10. Schultz and Hatch, "Living with Multiple Paradigms," 529–57; Haridimos Tsoukas and Mary Jo Hatch, "Complex Thinking, Complex Practice: The Case for a Narrative Approach to Organizational Complexity," *Human Relations* 54, no. 8 (August 2001): 979–1013; Gioia and Pitre, "Multiparadigm Perspectives"; and Weaver and Gioia, "Paradigms Lost," 565–90. Although Gioia and Pitre take research directions similar to those of Schultz and Hatch, Weaver and Gioia contest the notion of paradigm incommensurability and offer yet another alternative.

11. Antoine Bousquet, *The Scientific Way of Warfare: Order and Chaos on the Battlefields of Modernity* (New York: Columbia University Press, 2009), 52–56.

12. Paparone, *Sociology of Military Science*, 163; Donald Schon and Martin Rein, *Frame Reflection: Towards the Resolution of Intractable Policy Controversies* (New York: Basic Books, 1994), 21; and Haridimos Tsoukas, *Complex Knowledge: Studies in Organizational Epistemology* (New York: Oxford University Press, 2005), 104–6.

13. Jerome Bruner, *Actual Minds, Possible Worlds* (Cambridge, MA: Harvard University Press, 1986), 50–52.

14. François Jullien, *A Treatise on Efficacy: Between Western and Chinese Thinking*, trans. Janet Lloyd (Honolulu: University of Hawaii Press, 2004). See also Jullien, *The Silent Transformations*, trans. Krzysztof Fijalkowski and Michael Richardson (London: Seagull Books, 2011), 6–15.

15. Jullien, *Treatise on Efficacy*, 70–73; Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Vintage Books, 1994), 62. Foucault outlines the classical system of symbolism that traditional military theorists such as Clausewitz, Jomini, and others appear to utilize. Paul Ricoeur, *Time and Narrative*, trans. Kathleen McLaughlin and David Pellauer, vol. 1 (Chicago: University of Chicago Press, 1983), 98–99. Ricoeur challenges classical Western approaches to history and knowledge construction. Hayden White, *The Content of the Form: Narrative Discourse and Historical Representation*, paperback ed. (Baltimore: Johns Hopkins University Press, 1990), 157–59. White explores subjectivist approaches that would poorly support Clausewitz's propositions of "centers of gravity" and his enduring trinity. Jacques Rancière, *The Ignorant Schoolmaster: Five Lessons in Intellectual Emancipation*, trans. Kristin Ross (Stanford, CA: Stanford University Press, 1991). Rancière's thesis deconstructs the entire Western educational process and suggests an alternative that is in opposition to Western pedagogic structures, including our dominant professional military education form. Ben Zweibelson, "The Ignorant Counterinsurgent: Rethinking the Traditional Teacher-Student Relationship in Conflicts," *Military Review* 95, no. 2 (April 2015): 94–105. Zweibelson applies the Rancière postmodernist concept to military counterinsurgency theory.

16. Alan Beyerchen argues that Clausewitz embraces complexity in a preindustrial fashion while Wm. J. Olson asserts that military devotion to Clausewitz is growing irrelevant for modern war applications. Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," *International Security* 17, no. 3 (Winter 1992–93): 59–90; and Olson, "The Continuing Irrelevance of Clausewitz," *Small Wars Journal*, 26 July 2013, <http://smallwarsjournal.com/jrnl/art/the-continuing-irrelevance-of-clausewitz>.

17. Michel Foucault, *Discipline and Punish: The Birth of the Prison*, 2nd Vintage Books ed., trans. Alan Sheridan (New York: Vintage Books, 1995).

18. Burrell and Morgan, *Sociological Paradigms and Organizational Analysis*. See also Gioia and Pitre, "Multiparadigm Perspectives," 585.

19. Fig. 2 is a modification of the original Burrell and Morgan graphic on four paradigms. The arrows indicate one direction on the spectrums presented in fig. 5. Each paradigm thus has a dissimilar combination of ontological and epistemological forces as compared to the others.

20. Paparone, *Sociology of Military Science*, 77–79; Weaver and Gioia, "Paradigms Lost"; and Schultz and Hatch, "Living with Multiple Paradigms." Weaver and Gioia argue that incommensurability is frequently a misunderstood element between paradigms while Schultz and Hatch offer one methodology for working "interplay" between paradigms without attempting to resolve tensions and paradox.

21. USSOCOM's JSOU, of which this author is the course director for design programs, uses this Burrell and Morgan model for students in their Design Thinking for Practitioners course for 2015–16.

22. Haridimos Tsoukas and Kevin Dooley, "Introduction to the Special Issue: Towards the Ecological Style; Embracing Complexity in Organizational Research," *Organization Studies* 32, no. 729 (2011): 730.

23. Bousquet, *Scientific Way of Warfare*; Bousquet, "Chaoplex Warfare or the Future of Military Organization," *International Affairs (Royal Institute of International Affairs 1944-)* 84, no. 5 (September 2008): 915–29; and Paparone, *Sociology of Military Science*.

24. Paparone, *Sociology of Military Science*, 115–30. See also Gioia and Pitre, "Multiparadigm Perspectives," 585–90.

25. Gioia and Pitre, "Multiparadigm Perspectives," 588–89.

26. For radical humanist examples, see Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987). Deleuze and Guattari devote an entire chapter, "The War Machine," to military considerations. See also Rancière, *Ignorant Schoolmaster*; and Jean Baudrillard, *Simulacra and Simulation*, trans. Sheila Faria Glaser (Ann Arbor: University of Michigan Press, 2001).

27. Zweibelson, "Ignorant Counterinsurgent." See also Zweibelson, "Preferring Copies with No Originals," *Military Review*, January–February 2014: 15–25. Zweibelson employs a radical humanist argument of Baudrillard's and Rancière's work (previous endnote) to challenge existing military approaches. Maj Ben Zweibelson, Lt Col Grant Martin, and Dr. Chris Paparone, "Frame Reflection: A Critical Review of U.S. Military Approaches to Complex Situations," *OODA*, September 2013, https://www.ooda.com/wp-content/uploads/2013/09/Frame-Reflection_A-Critical-Review-of-US-Military-Approaches-to-Complex-Situations-final.pdf.

28. Gioia and Pitre, "Multiparadigm Perspectives," 589–90.

29. Qiao Liang and Wang Xiangsui, *Unrestricted Warfare* (Beijing: People's Liberation Army Literature and Arts Publishing House, February 1999). Liang and Xiangsui provide a radical structuralist critique of American military strategy as well as a narrative that prophesies radical transformation towards associated radical socialist concepts in warfare.

30. Lewis and Grimes, "Metatriangulation"; and Walid Phares, *Future Jihad: Terrorist Strategies against the West* (New York: Palgrave Macmillan Publishing, 2005). Phares offers some framework on the doomsday outlook that some Islamic groups profess. Applying the Burrell and Morgan framework here adds additional value.

31. Gioia and Pitre, "Multiparadigm Perspectives," 588. See also Peter Berger and Thomas Luckmann, *The Social Construction of Reality: A Treatise in the Sociology of Knowledge* (New York: Anchor Books, 1967), 5–15; Hayden White, *Tropics of Discourse: Essays in Cultural Criticism* (Baltimore: Johns Hopkins University Press, 1978), 6; and Baudrillard, *Simulacra and Simulation*, 152–53.

32. Karl Weick, "The Collapse of Sensemaking in Organizations: The Mann Gulch Disaster," *Administrative Science Quarterly* 38, no. 4 (1993): 628–52; Weick, "The Role of Imagination in the Organizing of Knowledge," *European Journal of Information Systems* 15 (2006): 446–52; Weick, "Drop Your Tools: An Allegory for Organizational Studies," *Administrative Science Quarterly* 41 (1996): 301–13; Weick and Karlene Roberts, "Collective Mind in Organizations: Heedful Interrelating on Flight Decks," *Administrative Science Quarterly* 38, no. 3 (September 1993): 357–81; Donald Schon, "Generative Metaphor: A Perspective on Problem-Setting in Social Policy," in *Metaphor and Thought*, ed. Andrew Ortony, 2nd ed. (Cambridge, UK: Cambridge University Press, 1993), 137–63; Schon, "Educating the Reflective Legal Practitioner," *Clinical Law Review* 2, no. 231 (1992): 231–50; and Clifford Geertz, "Deep Play: Notes on the Balinese Cockfight," *Daedalus* 134, no. 4 (Fall 2005): 56–86. Geertz's work is added here as a complementary study in anthropology that holds an interpretivist outlook.

33. Geertz, "Deep Play"; Linda Putnam and Michael Pacanowsky, eds., *Communication and Organizations: An Interpretive Approach*, Sage Focus ed. (Beverly Hills: Sage Publications, 1983); Paul Jeffcutt, "From Interpretation to Representation in Organizational Analysis: Postmodernism, Ethnography and Organizational Symbolism," *Organizational Studies* 15, no. 2 (1994): 241–74; Nick Turnbull, "Interpretivism and Practice in Governance Studies: The Critique of Methodological Institutionalism," *British Politics* 6, no. 2 (2011): 252–64; and Karl Weick, "Organizational Communication: Towards a Research Agenda," in Putnam and Pacanowsky, *Communication and Organizations*, 13–30. Geertz offers an interpretivist approach to what is an anthropological study while Putnam and Pacanowsky edit an interpretivist approach to communication and organizational theory. Jeffcutt approaches postmodernism with interpretivism, and Turnbull critiques governmental applications through an interpretivist lens. Weick

moves along a similar interpretivist path as the aforementioned researchers in his “Organizational Communication” piece.

34. Clarke-Hill, Li, and Davies, “Paradox of Co-operation and Competition,” 18.

35. United States Army Center for Military History (CMH) Publication 105-1-1, *The U.S. Army Chief of Staff's Professional Reading List*, 2014, accessed 28 February 2015, http://www.history.army.mil/html/books/105/105-1-1/CMH_Pub_105-1-1_2011.pdf. For additional analysis on the dominance of objective, analytical, and scientific-based focuses by military organizations, see Bousquet, *Scientific Way of Warfare*, 60; Bousquet, “Cyberneticizing the American War Machine: Science and Computers in the Cold War,” *Cold War History* 8, no. 1 (January 2008): 90; and John L. Romjue, *American Army Doctrine for the Post-Cold War* (Fort Monroe, VA: Military History Office, United States Army Training and Doctrine Command, 1997), 11. See also Bousquet, *Scientific Way of Warfare*, 128–29; and Aaron Jackson, *The Roots of Military Doctrine: Change and Continuity in Understanding the Practice of Warfare* (Fort Leavenworth, KS: Combat Studies Institute Press, 2013), 52–53.

36. Christopher Papparone and William Davis Jr., “Exploring Outside the Tropics of Clausewitz: Our Slavish Anchoring to an Archaic Metaphor,” in *Addressing the Fog of the COG: Perspectives on the Center of Gravity in US Military Doctrine*, ed. Celestino Perez (Fort Leavenworth, KS: Combat Studies Institute Press, 2012), 66–69. See also Phillip Pattee, “Center of Gravity: Right Idea, Wrong Direction,” in Perez, *Addressing the Fog of COG*, 124–25; and Beyerchen, “Unpredictability of War,” 62. Beyerchen breaks from others and attempts to make a nonlinear functionalist (complexity theory) argument reinterpreting Clausewitz. Olson, “Continuing Irrelevance of Clausewitz”; and Joseph Strange and Richard Iron, “Center of Gravity: What Clausewitz Really Meant,” *Joint Force Quarterly* issue 35 (2004): 25.

37. The following works challenge the dominance of Clausewitz in different approaches: Papparone and Davis, “Exploring Outside the Tropics of Clausewitz”; Olson, “Continuing Irrelevance of Clausewitz”; and Ben Zweibelson, “An Awkward Tango: Pairing Traditional Military Planning to Design and Why It Currently Fails to Work,” *Journal of Military and Strategic Studies* 16, no. 1 (2015): 11–41.

38. Haridimos Tsoukas, “The Missing Link: A Transformational View of Metaphors in Organizational Science,” *Academy of Management Review* 16, no. 3 (1991): 571. See also Max Esade and Bill McKelvey, “Integrating Modernist and Postmodernist Perspectives on Organizations: A Complexity Science Bridge,” *Academy of Management Review* 35, no. 3 (2010): 418.

39. Johnathan Johnson and Brian Burton, “Chaos and Complexity Theory for Management,” *Journal of Management Inquiry* 3 (1994): 328.

40. See “Air Force Chief of Staff Reading List, 2014,” accessed 16 March 2016, http://static.dma.mil/usaf/csafreadinglist_2014/03_books.html.

41. The term *transdisciplinary* is distinct from *interdisciplinary* or *multidisciplinary*. A multidisciplinary approach would feature professionals using different disciplines collectively, but the transdisciplinary approach requires each professional to acknowledge alternative perspectives by employing the language, symbols, metaphors, and concepts of other disciplines outside their specialty to gain deeper group appreciation.

42. Tsoukas, *Complex Knowledge*, 172.

43. Schultz and Hatch, “Living with Multiple Paradigms,” 530–33. See also Lewis and Kelemen, “Multiparadigm Inquiry,” 252; Lewis and Grimes, “Metatriangulation,” 673–75.

44. Klaus Krippendorff, “Principles of Design and a Trajectory of Artificiality,” *Journal of Product Innovation Management* 28 (2011): 417.

45. Kuhn, *Structure of Scientific Revolutions*, 147–50. See also Burrell and Morgan, *Sociological Paradigms and Organisational Analysis*; Gioia and Pitre, “Multiparadigm Perspectives,” 584–86; and Weaver and Gioia, “Paradigms Lost,” 567–69.

46. Damian Popolo, “French Philosophy, Complexity, and Scientific Epistemology: Moving beyond the Modern ‘Episteme,’” *Emergence* 5, no. 1 (2003): 86. See also Bousquet, “Cyberneticizing the American War Machine,” 90.

47. Karl Weick, “Reflections: Change Agents as Change Poets—On Reconnecting Flux and Hunches,” *Journal of Change Management* 11, no. 1 (March 2011): 16–17. See also Paul Edwards, *The Closed World: Computers and the Politics of Discourse in Cold War America* (Cambridge, MA: MIT Press, 1996), 127–28. Edwards quotes Robert McNamara famously demanding data and trivializing nonanalytic perspectives (poetics) during the Vietnam War period.

48. Baudrillard, *Simulacra and Simulation*.

49. Zweibelson, "Preferring Copies with No Originals." The author employs Baudrillard's book to convey the military practice of simulacra in training and education.
50. Rancière, *Ignorant Schoolmaster*.
51. Zweibelson, "Ignorant Counterinsurgent." The author employs Rancière's book to explain military educational and counterinsurgent practices within a largely radical humanist approach while also incorporating functionalism.
52. Deleuze and Guattari, *Thousand Plateaus*.
53. Chuck Palahniuk, *Fight Club* (New York: W. W. Norton, 17 October 2005).
54. Liang and Xiangsui, *Unrestricted Warfare*.
55. Anatol Rapoport, ed., "Editor's Introduction to *On War*," in Carl Von Clausewitz, *On War* (New York: Penguin Books, 1968).
56. Raphael Patai, *The Arab Mind*, rev. ed. (New York: Hatherleigh Press, 2007).
57. Sayyid Qutb, *Ma'ālim fī al-Tarīq* (Rām Allāh: Dār al-Kutub al-Thaqāfiyah, [1987?]).
58. Esade and McKelvey, "Integrating Modernist and Postmodernist Perspectives," 429.
59. Popolo, "Moving beyond the Modern 'Episteme,'" 78.
60. Weick, "Reflections," 17. Weick uses the term *change poet* for what interpretivists perform for organizational development through subjective inquiry and exploration.
61. White, *Content of the Form*.
62. Berger and Luckmann, *Social Construction of Reality*, 59.
63. Paul Ricoeur, *Time and Narrative*, trans. Kathleen McLaughlin and David Pellauer, vol. 1 (Chicago: University of Chicago Press, 1983).
64. *Ibid.*, 78.
65. Douglas Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid* (New York: Basic Books, 1979).
66. Nassim Nicholas Taleb, *The Black Swan* (New York: Random House, 2007), 69.
67. Tsoukas, *Complex Knowledge*; and Bousquet, *Scientific Way of Warfare*.
68. Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: John Hopkins University Press, 1989).
69. Ahl and Allen, *Hierarchy Theory*, 1. See also Fritjof Capra, *The Web of Life* (New York: Anchor Books, 1996), 29; and Taleb, *Black Swan*, 16. These authors charge that human efforts to categorize and reduce complexity into components miss the overarching nature of complexity.



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Institutional Memory and the US Air Force

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No modern war has been won without air superiority.

—Gen T. Michael Moseley, 2007

Although the vague term *modern war* leaves some question about the wars General Moseley was referring to, his 2007 white paper raises questions regarding airpower's impact and historical record, especially in light of the two conflicts that consumed the US military at the end of that year.¹ The question of whether or not air superiority is vital to successful military operations is nothing new; indeed, arguments concerning the utility of American airpower have raged in earnest for over 100 years. No technological milestone such as the atomic bomb, supersonic flight, precision-guided weapons, or even stealth has settled the debate about where Airmen and airpower fit in the dialogue of national defense. After each advance is tested in combat, a new round of intellectual sparring commences regarding

the effect of airpower. Though hugely useful in the development of military thinking, these differing schools of thought have always returned to fundamental questions, the answers to which vary widely depending on the strategic context of the day. How does airpower best contribute to the joint force? Is airpower a supporting arm, or is it supported by the other services? Can airpower alone achieve strategic effects? The answers are more than academic; they shape the Air Force's policy decisions, affect joint operational planning, and give political decision makers a wide range of options to consider in their responses to crises at home and abroad.

Since the answers are also interconnected, at times paradoxical, and dependent on a deep understanding of the global strategic context, it is imperative that the Air Force develop and maintain a coherent vision for how airpower can contribute to national security objectives. At odds with this consistent dialogue are a number of factors: most importantly, the service's institutional memory of how it fights and what it fights with—the ways and means of war fighting. Critical to maintaining its competitive edge over the rest of the world, the service's institutional memory is nevertheless heavily influenced by what this article proposes as two central factors: (1) the preferred “American Way of War” and (2) the enormous influence of Operation Desert Storm on how the Air Force views its role as part of the joint force. Although highly debatable, often considered, and rarely put into practice, the “American Way” desired by the US military is total war—one that is over quickly. The military's history, record of success, and current acquisition policies, coupled with how it is organized, trained, and equipped, all point to a force designed for a decisive contest. Compounding this facet of the Air Force's institutional memory is the brilliant success of air operations during Desert Storm, which has resulted in ingrained practices at the tactical and operational levels that are not always fit for the purpose at hand. This article, therefore, explores the concept of institutional memory and explains how these two factors contribute to the service's institutional memory and influence decision making at all levels.

Institutional Memory

Complex organizations often struggle with gaining and maintaining institutional memory. A term often used interchangeably with *institutional knowledge* and *organizational memory*, *institutional memory* is defined as a “collective set of experiences, lessons learned and best practices that a person or a group of people in the workplace have accumulated over time.”² Codifying the collective lessons and experiences of a disparate group of personnel with frequent turnover is no easy task, but the Air Force has unique tools at its disposal. Most notable among them are service doctrine and collective experience. Including both the tactics, techniques, and procedures of an individual weapons system and the capstone joint publications series issued by the chairman of the Joint Chiefs of Staff, doctrine is one of the central reservoirs of institutional memory for the American military. Additionally, with more than 600,000 members in the Air Force, Air Force Reserve, and Air National Guard, the total force holds an immense trove of operational experience that is utilized to reconstitute its manpower. This expertise, together with the world's best

training opportunities, allows the Air Force to pass its hard-earned institutional knowledge from one generation of Airmen to another. Many large civilian and government entities may struggle to preserve institutional memory, but the Air Force excels. Total war as the true and only “American Way” of war is an overstatement; however, it is the primary influence on the ways and means that the service develops for a number of reasons, beginning with the birth of the modern American military during World War II.

Total War and Desert Storm

Because they threatened national survival, World War II and the subsequent Cold War forced the US military first to wage and then constantly prepare for total war. For the US Air Force, this preparation meant that for the first four decades of its existence, it was primarily organized, trained, and equipped to fight war on a global scale. In the midst of this readiness, facing a limited war in Vietnam, the service was slow in adapting its tactics, albeit as part of a woefully insufficient strategy. Ultimately, the Air Force concluded that a more total war-like effort, as demonstrated in Operation Linebacker II, could have changed the course of the conflict. Over time, this consistent focus morphed into an institutional memory, resulting in constant preparation for high-end warfare against a near-peer adversary. Although this procedure paid huge dividends in Desert Storm, the Air Force faces a significant challenge in balancing the demands of a complex global security landscape with those of an uncertain future. Arguably, the genesis of this theoretical mind-set and practical application is World War II, but its current form is influenced by a renowned strategist whose effect on US military thinking remains unsurpassed.

The modern conception of total war emerged from Napoleon’s ability to harness both the passion of the newly liberated French mind and the resources of the state through his *levée en masse*. Carl von Clausewitz, the world’s most famous observer of the Napoleonic Wars, described war as “an act of force, [and] Clausewitz could discern no logical ‘internal’ or self-imposed limit on the use of force.”³ When read selectively or uncritically, the Prussian’s writings can easily be interpreted as an endorsement of total war. During the interwar period, British military strategist B. H. Liddell-Hart actually blamed Clausewitz and his opus *On War* for the costly strategy of the Western Front: “He was the source of the doctrine of ‘absolute war,’ the fight to a finish theory. . . . Clausewitz looked only to the end of war, not beyond war to the subsequent peace.”⁴ If Liddell-Hart is to be believed, any strategist who follows the teachings of Clausewitz runs the risk of implementing a misplaced emphasis on total war. Interestingly, in the aftermath of Vietnam, the Air Force reinvigorated its total war concepts, developing a renewed theoretical underpinning in which Clausewitz emerged as a key influence on both strategy and professional military education.

On War’s impact has spread far beyond a handful of military historians or “bookish” officers; rather, it is the foundational text of American military thought, as described by Phillip Meilinger: “Clausewitz has become an icon among military officers of all the services, and his ideas are taught in every war college, staff college, and service

academy in the country. It is common for a military writer or briefer to begin or end an argument with a quote from Clausewitz, presumably lending the author/speaker an aura of credibility.”⁵ Renowned Cold War theorist Bernard Brodie describes the unfortunate truth behind this obsession, lamenting that Clausewitz “has been rarely read, more rarely understood, but abundantly quoted.”⁶ Liddell-Hart’s aforementioned critique of Clausewitz, though clear, actually echoed these words: “Not one reader in a hundred was likely to follow the subtlety of his logic or to preserve a true balance among such philosophical jugglery.”⁷ Despite this reputation of misleading readers, especially with regards to the totality of war, *On War* consistently reveals incredible nuance. Clausewitz’s logic is exemplified as his dialectical method acknowledges a vast gap between “absolute war” (total war) and “real war”: “The more powerful and inspiring the motives for war . . . the closer war will approach its abstract concept . . . the more closely will the military aims and the political objects of war coincide, and the more military and less political will war appear to be.”⁸

Note how Clausewitz labels a move towards total war as one that approached its “abstract concept,” acknowledging the rarity of this form of conflict. His writings reveal that “real war” is clearly something less than total war since the absolute form is the extreme exception rather than the rule. In light of the frustrating incremental nature of the Vietnam air campaign, it is easy to understand why the military and the Air Force gravitated to the selected portions of *On War* that seemingly called for adherence to a total war doctrine whereby overwhelming military force is the key to victory. Has an institutional memory that focuses on this type of warfare, coupled with a new intellectual foundation built on misinterpretations of Clausewitz, reinforced the notion that the Air Force must prepare for total war through the acquisition of advanced technology? According to National Defense University, “Organizations can have inadequate memories of success and failure because leaders develop processes to address immediate issues, but fail to evaluate if these processes have future value.”⁹ Misleading institutional memory, therefore, springs from not properly analyzing the circumstances that led to either success or failure. In the case of the Air Force, a stunning victory in Desert Storm heavily influenced the subsequent 25 years for two important reasons. First, a failure to fully appreciate (or acknowledge) the distinctive characteristics of the war to liberate Kuwait led to the incorporation of incomplete lessons into the Air Force’s doctrinal thinking. Second, the incredibly effective (and globally broadcast) use of both stealth and precision-guided munitions reinforced the Air Force’s emphasis on technological superiority, which influences decisions to this day.

Doctrine is imperfect and demands constant scrutiny, as demonstrated by the long road that led to the production of Field Manual (FM) 3-24 / Marine Corps Warfighting Publication (MCWP) 3-33.5, *Counterinsurgency*, the US Army’s counterinsurgency (COIN) doctrine, released in December 2006.¹⁰ As Iraq spiraled into chaos following the conventional war-fighting phase, the US military quickly found its institutional memory, in the form of COIN doctrine, utterly insufficient for the task at hand. Under the leadership of then-lieutenant general David Petraeus, the US Army and US Marine Corps collaborated on FM 3-24/MCWP 3-33.5 to capture the newfound experience of their collective institutions while simultaneously reviving critical, long-forgotten lessons of COIN. Following its release and General Petraeus’s widely hailed imple-

mentation of a COIN strategy during the 2007–8 “surge” of forces in Iraq, FM 3-24/MCWP 3-33.5 became a must-read for Soldiers, scholars, and average Americans alike. Arguably, never before had military doctrine featured so prominently in America’s national consciousness. Despite the unprecedented success of FM 3-24/MCWP 3-33.5 in both popular culture and in practice, an important point, as noted by John Nagl, is that doctrine is a “trailing indicator” of institutional learning.¹¹ It is therefore essential that a service ground its doctrine in contextual understanding and address lessons learned rather than using it to trump past success. The latter phenomenon is an indicator of a failure to learn the true lessons of experience. Unlike the development of FM 3-24/MCWP 3-33.5, which was infused with recent operational lessons, Air Force doctrine has evolved much more slowly since Desert Storm.

Following that operation, the Air Force fully embraced the teachings of Col John Warden. The central architect of the plan to paralyze the Iraqi state through his “Five Rings” theory, Warden was the product of an Air Force whose members were still strongly influenced by the difficult days of the Rolling Thunder campaign. He had created his theory, in part, due to the Air Force’s institutional memory of Vietnam, even giving his plan the code name Instant Thunder to distinguish it from that bygone “Rolling” operation. In 1991 brilliant results in combat against Iraq now presented the Air Force an opportunity to broaden its intellectual scope—to search for new and better ways of employing airpower in a variety of environments. Many iterations of doctrine followed, but the Warden model lay at the heart of Air Force strategy, leaving the impression that the service was preoccupied with fighting its last war and trying in vain to make subsequent engagements fit its preferred theoretical model. For Andrew Hill and Stephen Gerras, this fact is unsurprising: “Dominant organizations have systems that focus organizational energy and attention on exploitation—that is, sustaining the status quo and continuing to improve what they already do.”¹² Why consider new ways to perform close air support or niche mission sets when you can win the war by overflying the battlefield to targets 1,000 miles behind the front line?

Unfortunately for the Air Force, it could not replicate the success of Instant Thunder in the conflicts that followed. In reality, this drop in effectiveness should not have come as a surprise. An inability or unwillingness to change course in the aftermath of highly successful outcomes is “a reasonable result of success,” as Hill and Gerras argue. “However, efficient exploitation often comes at the expense of continued learning and innovation.”¹³ Carl Builder notes that the Air Force should have seen the war to liberate Kuwait for what it was—a unique set of circumstances: “History may reveal that Operation Desert Storm was the final expression of an ending of a military era rather than the prototype for the next one.”¹⁴ Although perspectives differed on what Desert Storm meant for the future, leaders from across the security landscape praised the Instant Thunder air campaign for signaling that a revolution in military affairs (RMA) had occurred. The campaign’s merits were undeniable, but its future applications proved that the model did not offer the long-term strategic advantages that many people predicted.

As Builder alludes to above, history demonstrates time and again that the shelf life of an RMA is fleeting. Napoleon, whose total war concepts also amounted to an RMA, ruled nearly all of Europe in 1811; in 1812 he invaded Russia with over

400,000 men (some sources estimate as many as 600,000 or more). By Christmas of that year, he had abandoned the approximately 30,000 surviving troops to counter a coup d'état in Paris—quite a legendary fall but a mistake destined to be repeated by Hitler after the Nazi war machine ushered in another RMA harnessing the power of armored warfare in the form of blitzkrieg. When an RMA's advantages begin to wane, whether through technology, politics, or maturation of the adversary, some individuals hold on for too long—often at great cost. American strategists and politicians are not immune from this syndrome, some of them still praising the 2011 Libyan bombing campaigns of Operations Odyssey Dawn and Unified Protector. Leaders who tout the effects of airpower in Libya must necessarily turn a blind eye to the terrorist breeding ground and unstable mess created by these campaigns.

Airpower's ability to “kick down the door” is often hailed as a fundamental capability. In fact, a significant limitation of total war from the air (and this metaphor) is that after you kick down the door, you usually have a reason to go inside and solve some sort of problem. If not, you probably need to apologize and rehang the door on its hinges. That said, if the United States has no intention of following a “decisive” airpower campaign with some form of ground presence or stabilizing force, then it leaves the broken door ajar for anyone to walk through, as it did in Libya. Fundamentally, the Air Force is constantly preparing for a technology-driven total war in both theory and practice, making it an attractive tool for quick “victories.” It is a tool, however, with limits on its strategic effectiveness. Preparation for this, the most dangerous rather than the most likely course of action, is expensive and inherently risky: “A security strategy focused almost entirely on the rare, at the expense of serious thought and action regarding the common, is not the most useful framework to live with.”¹⁵ Despite the service's having far and away the best and most expensive training programs in the world, some individuals point out that if the Air Force is not a generation ahead technologically, then it cannot fully support the joint force or defend US interests.

Writing in 1995, then-major David Fadok (a Rhodes Scholar destined to command Air University) invoked military strategist Eliot Cohen in laying out a case against such a mind-set:

Cohen cautions against such an analytical approach to military strategy since it regards the enemy as “a passive collection of targets,” assumes that the enemy resembles us, and considers technology rather than human nature to be the controlling element in war. . . . Collectively, these assumptions “discourage the detailed study of one's opponent, his language, politics, culture, tactics, and leadership.”¹⁶

The combined voices of Fadok and Cohen accurately predicted the struggles the US military would face in both Afghanistan and Iraq, where technological solutions to strategic problems remained elusive. The Army, Navy, and Marine Corps all have love affairs with various weapons systems, but these services are fundamentally tied to geographic domains. The land, sea, and littoral remain at the core of the Army, Navy, and Marines, respectively. Although the Air Force preaches air, space, and cyberspace as its environs, its real domain is technology.¹⁷ Builder warns of the danger of this infatuation: “The Air Force, by contrast, has identified itself with the air weapon, and rooted itself in a commitment to technological superiority.

The dark side of this commitment is that it becomes transformed into an end in itself when aircraft or systems, rather than missions, become the primary focus.¹⁸ Nightly CNN broadcasts of precision weapons striking targets with pinpoint accuracy became some of the lasting images of Desert Storm. Gen Norman Schwarzkopf and Lt Gen Charles Horner used this footage to great effect in press briefings as they demonstrated to the world the awesome might of the American military—especially the Air Force. As evidenced by its recent behavior in acquisitions, it is clear that the Air Force was heavily influenced by these images as well.

In his memoir, *Duty*, former secretary of defense Robert Gates describes the Air Force as “one of my biggest headaches.”¹⁹ Though far from a flattering description, it may be an understatement since these words appear in a chapter called “One Damn Thing after Another,” in which he details his firings of Air Force Secretary Michael Wynne and Chief of Staff Michael Moseley.²⁰ Gates makes it clear that the dismissals were directly related to mishandling of the Air Force nuclear enterprise, but his frustrations with the service began early in his tenure, and his criticism on lack of attention paid to the wars at hand is a recurring theme in the book: “Nearly every time Moseley and Air Force Secretary Mike Wynne came to see me, it was about a new bomber or more F-22s.”²¹ Only two months before the firings, Gates addressed students at Air University, the intellectual home of the Air Force, publicly voicing his frustration: “My concern is that our services are still not moving aggressively in wartime to provide resources needed now on the battlefield. I’ve been wrestling for months to get more intelligence, surveillance, and reconnaissance assets into the theatre. Because people were stuck in old ways of doing business, it’s been like pulling teeth.”²² In the eyes of Gates, the institutional memory, the “old ways” of doing Air Force business, impeded combat operations. Long-standing beliefs, when interwoven through a large bureaucracy, create an inertia that is incredibly difficult to overcome.

A Way Forward?

Military strategy and *military procurement* are terms that frequently appear in analysis critical of Air Force policy. In reality, they are both misnomers. Purely “military” strategy or procurement is a thing of the past. In the time of Napoleon and Clausewitz, when the general and the statesman were one and the same, the spirit of these terms took on a much different meaning. The messy politics of the twenty-first century plays a huge and overbearing role in nearly every facet of US Air Force policy and execution. Members of Congress are keenly aware of the budgetary conundrum the Air Force faces, but they have little sympathy with the central message the service is sending via its budget proposals. When the service offers up the A-10, KC-10, U-2, or another emotionally charged and not yet replicated platform, it looks like it is playing chicken with Congress—a dangerous game it cannot win. Consequently, it is important to fully grasp how institutional memory affects the Air Force’s decision making. Changes, especially those that affect jobs in congressional districts, will always be emotional. By articulating its brilliant history of adapting a force designed for total war to meet the demands of combat, the Air

Force might more successfully partner with Congress to push through the initiatives it holds dear.

Political influence is both inescapable and a causal factor in many of the service's apparent missteps, but it is not an excuse for finding new and innovative ways to think about its strategic decisions. Unfortunately, no matter how forward thinking the Air Force becomes, it will at times fail to understand the nuance of the politics that determine its future, but that too is understandable. Michael Clarke illuminates the sheer difficulty of understanding the how, what, why, or when of the political decision-making process, which further complicates the task for the military strategist or acquisitions official: "Any study of a state's foreign policy over a given period reveals that rather than a series of clear decisions, there is a continuing and confusing 'flow of action' made up of a mixture of political decisions, non-political decisions, bureaucratic procedures, continuations of previous policy, and sheer accident."²³ What, then, should the Air Force do in the face of a messy political process that drives strategy and procurement and leaves far too little room for decision making?

The answers, at least on the surface, are not overly complex. First, the 2015 *National Security Strategy* uses the word *partnership* 27 times in 29 pages of text.²⁴ It clearly states that working with allies of all strengths and sizes is central to American foreign policy: "We will help build the capacity of the most vulnerable states and communities to defeat terrorists locally. Working with the Congress, we will train and equip local partners and provide operational support to gain ground against terrorist groups. This will include efforts to better fuse and share information and technology as well as to support more inclusive and accountable governance."²⁵ To train, equip, and share information and technology with US partners, the Air Force must have a well-balanced infrastructure. Many nations are involved in the F-35 project, but none of them is a fragile or failing state. An acquisition plan that includes lower technology and lower-cost solutions to capability gaps gives the Air Force an edge in assisting those states that need it most—those that cannot dream of operating such expensive technologies. A shift of this nature should move the Air Force away from its focus on total war and towards a sustainable long-term strategy of collective defense initiatives.

When articulating strategy or acquisitions decisions, Air Force leaders must remain mindful of the service's institutional memory, which is heavily influenced by finding a technological solution to total war. In some cases, this context is of enormous benefit to the future security of the United States, as witnessed in the long-term technological buildup and then successful employment of these systems in Desert Storm. In others, as previously illuminated by Secretary Gates, the Air Force's institutional memory is a significant hindrance. Regardless of the situation, the service's leaders should take note that "history is replete with examples of militaries that failed due to their inability to transform organizations and culture, adopt new operational concepts, or leverage breakthrough technologies."²⁶ Ironically, this advice was penned by US Air Force chief of staff T. Michael Moseley a few months before he was asked to step down. A clear strategy to organize, train, and equip the force in a reasonable way that prepares the Air Force for its most likely, rather than its most dangerous, security challenges could reduce the influence of this memory and enhance US security partnerships around the globe. ✪

Notes

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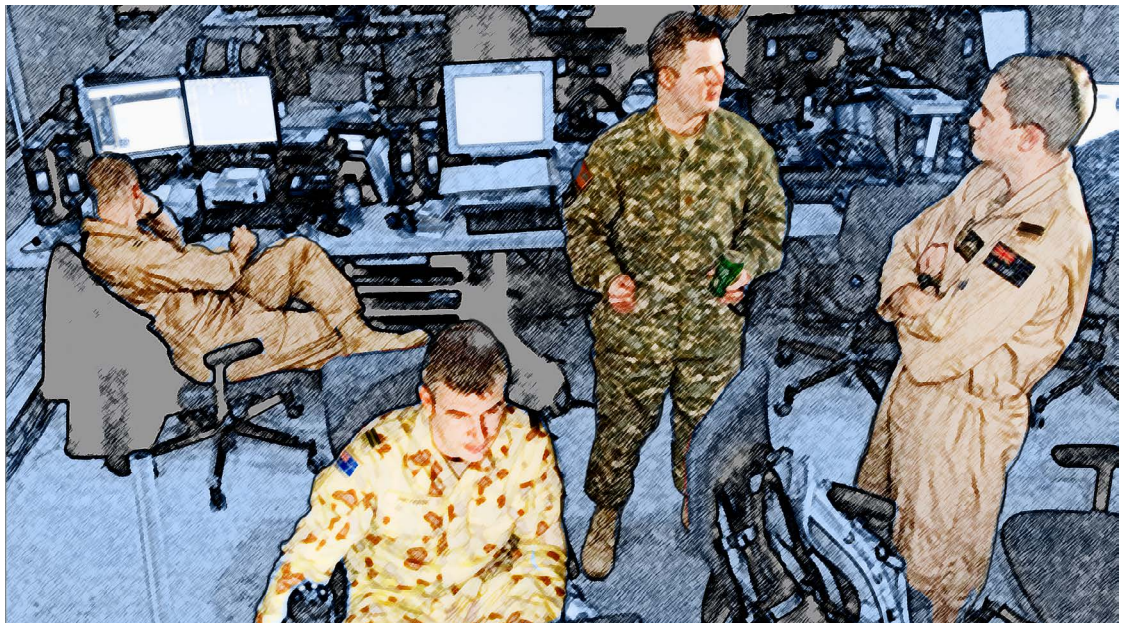
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Command and Control of Joint Air Operations through Mission Command

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As battle becomes more complex and unpredictable, responsibilities must be more and more decentralized. . . . This will require all commanders to exercise initiative, resourcefulness, and imagination—operating with relative freedom of action.

—Gen Bruce C. Clarke
Commander in Chief, US Army Europe

For centuries, the US armed forces have endeavored to find the perfect balance between higher headquarters control and delegation of authority to subordinate units and commanders. Whether framed as the US Air Force's tenet of centralized control / decentralized execution or the US Army's mission command,

the underlying concept of entrusting Soldiers, Sailors, Marines, and Airmen with increased responsibility and promoting initiative is the foundation of this much-needed effort. To effectively command and control (C2) joint air operations in today's contested and degraded environment while preparing for the volatile threats of tomorrow, the Air Force and joint community must instill the concept and principles of mission command in their culture. Consequently, this article discusses the origins and concepts of mission command, addresses and applies the principles of mission command to the Air Force and joint C2 decentralized operating environment, and outlines the C2 architecture systems, processes, and philosophy of command required to enable mission command effectively.

Mission Command Concepts

The concepts of mission command date back to the 1890s when Prussian-German tacticians, unhappy with overly directive types of command, developed a more flexible construct called *Auftragstaktik*, which empowered subordinate commanders to exercise initiative.¹ *Auftragstaktik*, according to US Army Training and Doctrine Pamphlet 525-3-3, *The United States Army Functional Concept for Mission Command*, “translates roughly to mission-type tactics” and essentially “held each German commissioned and noncommissioned officer duty bound to do whatever the situation required, as he personally saw it.”² This concept was vital in allowing subordinates to exercise judgment and initiative in an operational environment characterized by slow communications—a place where a “decentralized approach to . . . [C2], or *Auftragstaktik*, proved more effective than a highly centralized command.”³ Approximately 90 years later, the Army had adopted those concepts officially into Army doctrine as *mission orders* or *mission command* and paved the way for injecting those terms into joint doctrine.⁴

Joint Publication (JP) 3-0, *Joint Operations*, defines mission command as the “conduct of military operations through decentralized execution based upon mission-type orders. Successful mission command demands that subordinate leaders at all echelons exercise disciplined initiative and act aggressively and independently to accomplish the mission.”⁵ Furthermore, as Lt Col James W. Harvard points out in his article “Airmen and Mission Command,” Army Doctrine Publication (ADP) 6-0, *Mission Command*, encompasses not only the reference to decentralized execution but also the strategic linkage of the art of command and science of control.⁶ Lastly, although the term *mission command* does not exist in Air Force doctrine, the basic principles are inherently illustrated in the service's *Basic Doctrine*: “Execution should be decentralized within a C2 architecture that exploits the ability of front-line decision makers (such as strike package leaders, air battle managers, forward air controllers) to make on-scene decisions during complex, rapidly unfolding operations.”⁷ Even though these principles of mission command have dwelled within the individual services for years, the Department of Defense needed a trigger to align the department as a whole and to enable a critical, synchronized, and integrated approach to leading the joint force.

Accordingly, in his 2012 *Mission Command* white paper, Gen Martin Dempsey, former chairman of the Joint Chiefs of Staff, outlines the vital need to instill and foster the concepts of mission command, noting that such a pursuit is “critical to our future success in defending the nation in an increasingly complex and uncertain operating environment.”⁸ He further points out that “the basic principles of mission command—commander’s intent, mission type orders and decentralized execution are not new concepts. They are a part of current joint and service doctrine,” as illustrated in the previous paragraph.⁹ General Dempsey makes a key point by declaring that renewed emphasis on the concept of mission command is absolutely vital to executing operations effectively as “Joint Force 2020” in a future dynamic security and threat environment that is vastly different from the one in which we operate today.¹⁰ Furthermore, as these smaller and lighter forces operate in geographically dispersed joint operations areas, the ability to conduct effective decentralized and distributed operations will be essential.

Additionally, General Dempsey asserts that these “smaller, lighter forces operating in an environment of increased uncertainty, complexity and competitiveness will require freedom of action to develop the situation and rapidly exploit opportunities.”¹¹ This observation is especially true with respect to wielding airpower. Because of its unique capabilities, airpower—as well as the subsequent tactical- and operational-level C2 of airpower—relies on the centralized control / decentralized execution concepts grounded in the basic principles of mission command.¹² Through an effective application of these principles of mission command, the Air Force and joint C2 community can adeptly conduct distributed air operations in a contested environment.

Principles of Mission Command

Build Teams through Trust

The first and most important principle of mission command is the ability to build cohesive teams through mutual trust.¹³ ADP 6-0, *Mission Command*, details this concept by noting that “mutual trust is a shared confidence among commanders, subordinates, and partners” and that “effective commanders build cohesive teams in an environment of mutual trust.”¹⁴ Such trust is mandatory for leading and executing in today’s complex global and geographically dispersed environments. To the joint force, trust must also become as natural as breathing or walking. As Donald Vandergriff remarks, “Mission command will require an institutional culture that fosters trust among commanders, encourages initiative and expects leaders to take prudent risk and make decisions based on incomplete information.”¹⁵ In many instances, however, an abundance of available information drives the need for trust even more.

Operating in today’s and tomorrow’s networked and distributed battlespace, joint force commanders (JFC) at all levels have more data available to them than ever before. The sheer volume of information both facilitates effective joint C2 decision making and contributes to the temptation of micromanagement at the operational and strategic levels.¹⁶ Not only are the concepts of mission command needed now

to meet the “broad range of potential missions, complex operations environment, and ill-structured situations” but also they “[correct] the 1990s defense transformation view that emerging technologies would lift the fog of war” and “permit an all-knowing headquarters.”¹⁷

The cure to overreliance on technology and the attainment of a virtual flashlight to illuminate a path through the fog of war depend upon building and instilling trust. Simply put, it is not possible to execute any joint operation effectively without the central pillar of trust between commanders and subordinates. Although subordinates must still understand the commander’s intent, it is in fact trust that “informs the execution of that intent.”¹⁸ Further, General Dempsey highlights the fact that “trust is the moral sinew that binds the distributed Joint Force 2020 together” and observes that “unless these attributes are made central to the basic character of the force, Joint Force 2020 will struggle to reach optimal performance levels.”¹⁹ Moreover, commanders of the joint force must leverage this mutual trust and their interpersonal relationships to build effective teams both inside their organizations and outside—with sister services and multinational partners.²⁰

However, trust does not happen overnight, and since it is the cornerstone of mission command, a failure to garner trust poses a significant hindrance. Specifically, high-level commanders, especially at the combined air and space operations center (CAOC) have a multitude of available information that allows unprecedented access to operational- and tactical-level data. Although useful in providing a common operational picture to commanders, this data also enables them to see incredibly detailed data; evaluate real-time, tactical-level maneuvers; and virtually get inside the radar scope, cockpit, or boots of the Airmen and Soldiers executing the mission. This capability, in turn, can potentially cause an erosion of trust on both sides. Tactical commanders, air battle managers, and other elements of the joint C2 that lead the air campaign as part of the theater air control system (TACS) feel usurped when their actions are prematurely questioned or micromanaged from above. Thus, higher-level commanders feel the need to intervene in real time as they observe their subordinate commanders executing the mission differently than they themselves would.

One of the main pathways to establishing trust with respect to air operations involves allowing those tactical-level commanders in the control and reporting center (CRC), Airborne Warning and Control System (AWACS), Marine air command and control system (MACCS), air defense sectors, and other elements of the joint TACS to truly execute their missions based on well-defined guidance and directives. The latter are spelled out in various levels of detail in documents like the joint air estimate, joint air operations plan (JAOP), air operations directive (AOD), theater and campaign special instructions (SPINS), rules of engagement, and daily updates to the air tasking order (ATO) and daily SPINS.

Additionally, these subordinate commanders and their units must be allowed to show initiative and drive, managing the air campaign in a decentralized manner while maintaining the appropriate level of centralized control. These documents offer a formal, well-defined way of specifically authorizing decentralized execution of the TACS elements, as well as the pilots and aircrews who execute the ATO, doing so through the use of sound judgment and “Airmanship.” However, Harvard emphasizes

the need for a proper balance of centralized control and decentralized execution based on the situation or nature of the operation.²¹ The level of decentralization down to the tactical level for a conventional air defense or close air support mission is appropriately higher than that for a strategic nuclear attack or a space operation.²² Finally, these governing documents and directives serve not only as a key to understanding the commander's guidance and intent with regard to planning and executing the air campaign but also as a critical enabler to establishing trust. Once trust becomes part of the joint force's DNA, the path toward instilling the concepts of mission command will become easier to traverse.

Create a Shared Understanding and Provide a Clear Commander's Intent

According to ADP 6-0, *Mission Command*, the process of creating a shared understanding of the joint operational environment, including its purpose, problems, and ways of solving them, is a “defining challenge for commanders and staffs.”²³ Furthermore, as General Dempsey comments, “Understanding . . . equips decision makers at all levels with the insight and foresight required to make effective decisions, to manage associated risks, and to consider second and subsequent order effects.”²⁴ To effectively create a shared understanding, the commander must “blend the art of command with the science of control,” thereby integrating the joint functions and expertly “understand[ing] the problem, envision[ing] the end state, and visualiz[ing] the nature of the operation.”²⁵ This understanding is then translated into guidance and direction in the form of assigned missions. However, the latter (e.g., C2; air defense; defensive/offensive counterair; close air support; strike; interdiction; intelligence, surveillance, and reconnaissance) must be within their capabilities: “The commander must understand what his subordinates can do, and trust—but not blindly—them to do it.”²⁶

Again, the basic concept of mission command, as well as the concept of a clear understanding, relies heavily upon solid comprehension of the commander's overall intent and the updated guidance that develops as the air campaign progresses. According to JP 3-0, *Joint Operations*,

Commander's intent is the commander's clear and concise expression of what the force must do and the conditions the force must establish to accomplish the mission. It is a succinct description of the commander's visualization of the entire operation and what the commander wants to accomplish. Commander's intent supports mission command and allows subordinates the greatest possible freedom of action.²⁷

In terms of the joint force, the JFC sets this intent as described above, and it encompasses all unified operations conducted in the various domains under the JFC's direction such as land, air, space, maritime, and special operations. The JFC will appoint a joint force air component commander (JFACC) to plan, coordinate, task, execute, and assess joint air operations based on the JFC's intent and guidance as well as the theater, campaign, or operations plans.²⁸ Some of the responsibilities of the JFACC include developing a JAOP, recommending air apportionment, allocating and tasking air assets, developing daily guidance for the AOD, “provid[ing] oversight and guidance during execution of joint air operations,” assessing results of joint air

operations, and performing roles of the airspace control authority and area air defense commander.²⁹

Thus, it is the responsibility of the JFACC to synchronize the efforts and overall understanding with the intent and guidance laid out by the JFC. To do so, the JFACC will issue a subsequent supporting mission statement and intent outlining the purpose and desired military end state as illustrated in the example commander's intent extracted from JP 3-30, *Command and Control of Joint Air Operations*:

The purpose of the joint air operation is to deter aggression. Should deterrence fail, I will gain and maintain air superiority, conduct joint offensive air operations, and support the JFLCC [joint force land component commander] counter-offensive in order to restore the territorial integrity and ensure the establishment of a legitimate government in a stable Pacifica region.³⁰

In addition to the commander's intent, the desired military end states are also included in the JAOP, along with other documents such as the AOD. The end states outlined by the JFACC are well defined and support the overall objectives directed by the JFC. However, they also include some airpower-centric goals:

- a. Adversary military forces will be capable of limited defensive operations, have ceased offensive combat operations, and complied with multinational war termination conditions.
- b. Adversary will retain no WMD [weapons of mass destruction] capability.
- c. Allied territorial integrity will be restored.
- d. JFACC-West will have passed ATC [air traffic control] to local authorities.³¹

Although this guidance starts at the top of the strategic and operational levels, it flows down to experts executing the air campaign at the tactical level. It is vital that such messaging and intent are clearly evident in the daily products that the joint force uses to execute the air campaign. These products, such as the AOD, SPINS, ATO, and airspace control order, are the primary focus of the tactical-level force and therefore the primary vehicle for signaling intent.

However, it may seem redundant to develop, present, and repeat the JFC's and JFACC's mission statement, commander's intent, and end states throughout numerous documents (campaign plan, JFC estimate, JFACC staff estimate, JAOP, AOD, area air defense plan, airspace control plan, and JFACC's daily guidance). Nevertheless, doing so is absolutely required for effective execution, and it serves two purposes (see the figure below). The first is to ensure that all efforts are clear, understood, and synchronized across the entire joint force and associated components and domains. The second is to be certain that all levels of execution—from the strategic and operational “big picture” planners, through the operational 72-hour ATO cycle planners and CAOC crew members, to the tactical-level C2 units and individual air assets flying the missions—completely understand their role. That role entails executing their “ATO line” as tasked; it also involves understanding the overall intent of the campaign, operation, and mission as it evolves daily. Through this funneling effect and synthesis, these Airmen, under the concepts of mission command, can then be prepared to execute as ordered—or, more importantly, exercise disciplined initia-

tive, particularly in a degraded and contested joint operational environment when and where necessary.

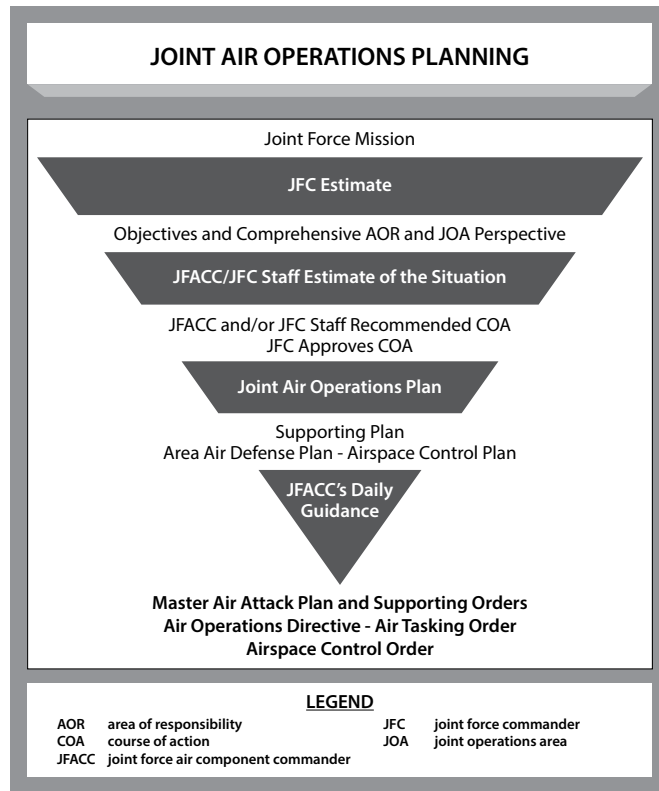


Figure. Joint air operations planning. (Reprinted from Joint Publication 3-30, *Command and Control of Joint Air Operations*, 10 February 2014, III-2, http://www.dtic.mil/doctrine/new_pubs/jp3_30.pdf.)

Exercise Disciplined Initiative

Promoting and instilling the concept of “exercise disciplined initiative” are a key component of mission command, relying greatly not only on the shared understanding developed through the commander’s guidance and intent but also on the critical foundation of trust. ADP 6-0, *Mission Command*, defines disciplined initiative as “action in the absence of order, when existing orders no longer fit the situation, or when unforeseen opportunities or threats arise.”³² Additionally, JP 3-30, *Command and Control of Joint Air Operations*, states that “joint air operations are normally conducted using centralized control and decentralized execution to achieve effective control and foster initiative, responsiveness, and flexibility.”³³

Both of the above definitions outline the main goal of mission command and centralized control / decentralized execution: to build a culture with a solid foundation of trust that encourages leaders to make sound decisions based on the information

available to them and the way that information relates to their current situation. Although ADP 6-0 specifically mentions “disciplined” initiative, an additional requirement must be “educated” initiative. This education comes from a clear understanding of the mission objectives, desired effect, and overall commander’s guidance. Specifically, the Airmen, Soldiers, Sailors, and Marines executing the air campaign must have solid knowledge of the appropriate governing documents, regulations, and guidance, such as the theater SPINS, rules of engagement, AOD, and daily updated/adjusted guidance provided by the JFACC.

Education also applies to the top-level commanders who develop and disseminate their intent, objectives, and overall guidance. In order for the operational- and tactical-level commanders to exercise disciplined and educated initiative, they must have a well-defined and clear intent from which to guide their initiative. General Dempsey supports this concept by asserting that “officers must be taught how to receive and give mission-type orders, and critically, how to clearly express intent.”³⁴

Furthermore, trust—which is built through that education—is a critical need for effective mission command both up and down the chain. According to General Dempsey, “Trust too is a learned behavior to be developed during education. . . . As responsible exercise of mission command does not entail blind trust, education must give officers the ability to recognize the capability for mission command in subordinates and the skills to know when and how to adjust their supervision.”³⁵ Additionally, that trust emphasized by General Dempsey, along with the ability and will to exercise disciplined initiative, is of key importance to executing the air campaign in a geographically dispersed and contested environment. It is one thing to effectively run decentralized and distributed operations in an environment in which the United States or coalition has full, uncontested use of all the needed mediums, such as the radio frequency spectrum, satellite access, line of sight (LOS) and beyond line of sight (BLOS) communications, and all of the data and information that flow across those mediums. Even in those permissive environments, leaders at operational levels have a difficult time truly letting the tactical-level units and commanders execute according to guidance and intent, particularly if the air campaign faces no robust air threat. This type of full or partial centralized execution inhibits tactical-level initiative as the lower units become desensitized to making decentralized decisions.

Accordingly, injecting a significant amount of communications degradation; vast, geographically dispersed units; and a robust air threat into that same environment makes the problem more complex. In this contested environment, with communications and data links either degraded or completely lost, it is imperative that the tactical-level joint C2 units and commanders execute disciplined and educated initiative based on their understanding of the intent and guidance provided throughout the campaign. Moreover, that level of decentralization also extends to the pilots and aircrews flying the missions in the event of lost or degraded communications with their tactical C2 units. Such decentralization—or mission command—permits the joint force to maintain the proper tempo and, according to General Dempsey, “operate at the speed of the problem.”³⁶

Lastly, in addition to understanding the intent and guidance based on all the mission planning and execution documents previously mentioned, the joint C2 units

must also receive more defined guidance based on the desired mission results. This time-tested, well-defined tool that should be used to guide tactical-level execution is known as mission-type orders.³⁷

Use Mission-Type Orders to Empower Subordinates

ADP 6-0, *Mission Command*, describes mission orders as “directives that emphasize to subordinates the results to be attained, not how they are to achieve them.”³⁸ Further, ADP 6-0 notes that such orders are used by commanders to “provide direction and guidance that focus the force’s activities on the achievement of the main objective, set priorities, allocate resources, and influence the situation.”³⁹ In essence, these mission-type orders are designed to convey well-defined guidance on the results desired while providing subordinates the maximum amount of freedom of action and promoting disciplined initiative.⁴⁰ Additionally, the use of these orders still allows commanders to supervise their subordinates, but rather than overcontrolling the situation, they intervene only when necessary to direct big-picture changes to the overall concept of operations.⁴¹ Such restraint, especially in today’s vastly networked battlespace, is critical and relies on the commanders’ ability to provide appropriate guidance and supervision while executing a “continual cognitive effort to understand, adapt, and to direct effectively the achievement of intent.”⁴²

Although this concept grew primarily out of efforts to C2 land forces efficiently, it certainly applies to the joint C2 of air operations. In an air defense scenario, for example, mission-type orders could include simple desired results such as “defend the critical assets listed in Defended Assets List (DAL) from air and missile attack” or “defend and protect strike package alpha and bravo throughout all phases of the mission to include marshal, ingress, target, and egress phases” in accordance with the AOD priorities. This type of direction allows the tactical-level joint C2 commanders and air battle managers to deal with the assets available to them according to the priorities and mission intent laid out by the JFACC.

Consequently, the commander of a CRC, serving as regional air defense commander or a subordinate sector air defense commander or senior director on board an E-3G AWACS is responsible for the management and employment of the air assets under his or her control. Specifically, these air battle managers, or their joint counterparts, are authorized to position combat air patrols, retain “commit authority,” scramble additional assets when deemed necessary, manage airborne tanker fuel offload/positioning, direct intercepts, decide on prioritization, direct hostile engagements, compile strike packages and appropriate supporting assets, and conduct a host of other air battle management tasks based on guidance and priorities. Further, the tactical-level joint C2 executing the air campaign makes these decisions and carries out disciplined, educated initiative based on the guidance found in the JFC and JFACC documents developed for the campaign (e.g., the JAOP, AOD, ATO, SPINS, and daily updated commander’s guidance). These documents are the framework and standards from which the joint C2 commanders and units apply the directed guidance found in the mission-type orders and subsequently synergize into a well-focused, decentralized effort to execute the overall air campaign.

However, as Harvard points out, promoting such initiative through tools like mission-type orders requires striking an appropriate balance of centralized control: “Overcontrolling air and space power robs it of flexibility, taking away initiative from operators. Undercontrolling air and space power fails to capitalize on joint force integration and orchestration, thus reducing its effectiveness.”⁴³ As the adage goes, “It depends,” and there is no black or white answer or Jominian formula for when and to what extent to decentralize the level of execution. The level is influenced by many factors such as mission type; threat and “robustness”; intensity, levels, availability of communication, and data flow; and other operational environment factors. However, the level of decentralization and associated initiative taken by subordinate commanders via the execution of mission-type orders also relies on the willingness to accept prudent risk at both the operational and tactical levels.

Accept Prudent Risk

The principle of accepting prudent risk depends upon a firm understanding of and adherence to the rest of the principles of mission command. It is not necessarily a step-by-step process of executing mission command but a synergistic integration and application of all the principles of mission command.

To allow the joint force to accept prudent risk, commanders must first understand the various levels and definitions of risk since they vary from service to service and tactical level to strategic level. ADP 6-0, *Mission Command*, observes that it is necessary for commanders to accept risk due the volatile, uncertain, complex, and ambiguous elements that exist in all military operations.⁴⁴ Furthermore, that document defines prudent risk as “a deliberate exposure to potential injury or loss when the commander judges the outcome in terms of mission accomplishment as worth the cost.”⁴⁵ “Annex 3-30, Command and Control,” published by the Air Force’s LeMay Center for Doctrine Development and Education, notes that “commanders should rely on delegation of authorities and promulgation of commander’s intent as methods to control forces. The commander’s intent should specify the goals, priorities, acceptable risks, and limits of the operation.”⁴⁶ It is through such well-defined intent, analysis, and acceptance of risk that the joint force can reasonably weigh the benefits of a successful mission or strike against the potential cost.

This mission focus is paralleled in the risk assessment definition in JP 5-0, *Joint Operation Planning*, but it also breaks the risk down into four categories:

- (a) Extremely high: loss of ability to accomplish the mission;
- (b) High: significantly degrades mission capabilities in terms of required mission standards;
- (c) Moderate: degrades mission capabilities in terms of required mission standards; and
- (d) Low: little or no impact on accomplishment of the mission.⁴⁷

In any case, it is imperative for both the commanders issuing mission-type orders and the subordinates receiving them to analyze and assess the appropriate level of risk. This in turn builds upon the understanding and intent provided and facilitates the aforementioned disciplined and educated initiative. Ultimately, it is the culmination of making a mission-focused decision at the tactical level based on the guid-

ance and information available and how that information and “picture” relate to the current situation.

Accordingly, the CRC, AWACS, or other tactical-level joint C2 commander must assess the risk based on his or her responsibilities, tasks, and objectives as they relate to his particular “lane” or battle management area. What is the risk of letting a threat penetrate defenses because they are unable to completely fill the identification matrix? At what point is the judgment call made to defend a protected area (civilian populace, infrastructure, etc.) from a high-speed air threat instead of waiting on a delayed clearance to engage from higher headquarters or in the event of degraded communications? What is the risk if the CRC or other joint C2 element does directly engage?

All of these risk questions are common and have occurred repeatedly in just about any air campaign scenario ever executed. They are inherent questions that the operational- and tactical-level commanders must address and continually assess while fulfilling their responsibilities in executing air operations. The simple, underlying fact is that these tactical-level commanders must know that their superiors trust them to make these decisions based on the information available to them at the time of decision. Furthermore, it is the responsibility of the tactical-level commanders and units to put extreme effort into knowing their operational environment and adequately preparing, studying, and applying the guidance, intent, and mission priorities to the situation. In short, it is not the “blind trust” that General Dempsey mentions but a credible trust earned through effort, education, experience, and training.⁴⁸ This vital trust serves as the “green light” for tactical-level commanders to make decisions and judgments during the fog of war while knowing they have the well-earned support and confidence of their superiors. That well-earned trust serves as the same green light for operational commanders to feel confident about how their subordinates will make decisions and adapt to the dynamic battlespace environment.

Processes, Systems, and Philosophy of Command

The final concept of mission command involves the processes, systems, and philosophy of command required to effectively execute joint air operations in a contested environment via mission command. The primary Air Force system used to C2 joint air operations is the C2 architecture itself, referred to as the TACS. This system and the processes and weapons systems (e.g., CAOC, CRC, air defense sectors, AWACS, and air support operations center) that make up the TACS, along with the sister services' joint C2 systems (MACCS, Aegis, E-2D, etc.), are the critical vehicle for executing the centralized control and decentralized execution of the air campaign. According to Air Force doctrine, “Centralized control and decentralized execution are key tenets of C2; they provide Airmen the ability to exploit the speed, flexibility, and versatility of airpower.”⁴⁹ Furthermore, Air Force *Basic Doctrine* maintains that “because of airpower’s unique potential to directly affect the strategic and operational levels of war, it should be controlled by a single Airman who maintains the broad, strategic perspective necessary to balance and prioritize . . . a . . . limited force.”⁵⁰

Execution of the air campaign translates into a single air component commander (i.e., C/JFACC) with the assets and mechanisms necessary to effectively synchronize, plan, execute, and assess combined or joint air operations in support of the JFC's objectives.⁵¹ However, the span of control and associated balance of control are important factors to consider, as Harvard points out: "We could characterize airpower operations in Iraq and Afghanistan as having a favorable span of control at the operational level—one enabled by a robust and uncontested C2 infrastructure."⁵² However, in a contested, less permissive operational environment characterized by communications degradation, jamming, and a robust air threat, the need for effective decentralized execution will outweigh efforts to sustain such a large span of control.⁵³

To effectively execute a robust, contested air campaign, the JFACC must ensure decentralized execution "within a C2 architecture that exploits the ability of front-line decision makers (such as strike package leaders, air battle managers, forward air controllers) to make on-scene decisions during complex, rapidly unfolding operations."⁵⁴ Such execution is the core concept of mission command and an absolute requirement for successful mission operations, particularly in this type of joint operational environment. In addition to instilling and adhering to the principles and concepts of mission command, various planning considerations such as coverage, connectivity, functionality, and placement are vital to ensuring that an effective C2 system and process are put in place.

Considerations for the Command and Control of Joint Air Operations

One of the first things to consider in building a viable joint C2 architecture for executing the air campaign through mission command is the overall force laydown of the TACS, including types of sensor and communications coverage, as well as connectivity back to the senior C2 element of the TACS—the air operations center (AOC).⁵⁵ Additionally, "Annex 3-30, Command and Control," points out that "the AOC should have secure and redundant communications with higher and lateral headquarters, as well as subordinate units."⁵⁶ Lastly in most scenarios, it will take a truly joint effort of Air Force, Marine, and Navy joint C2 assets to cover the joint operations area fully. Developing the right mix of joint ground-based (CRC, MACCS), seaborne (Aegis), and airborne (E-3G AWACS, E-2D, E-8C Joint Surveillance Target Attack Radar System) C2 elements is particularly critical in a geographically dispersed environment with varying types of terrain and open seas from which to operate.

Connectivity is yet another important factor during development of an effective joint C2 architecture. According to "Annex 3-30," "The structure and positioning of the TACS elements adapt as needed to effectively control airpower," emphasizing the importance of not only the geographic placement and proximity of the sensors and communications nodes mentioned above but also the type of sensor and the medium used to connect.⁵⁷ Planning guidance, intent, and subsequent mission-type orders are transmitted via the various types of mediums, such as radio frequency, LOS, BLOS, tactical satellite communications, fiber optic, and the types of communication (voice, data, "chat" protocols, cloud computing). In addition, these mediums are the primary method for real-time communications during execution of the air

campaign, depending upon the mission and/or level or permissiveness. On the one hand, cloud computing could be used as the primary means of communication to transmit mission-type orders for nonkinetic, less-than-time-sensitive missions.⁵⁸ On the other hand, multiple means such ultrahigh frequency and other LOS and BLOS tactical communications would be used to transmit time-sensitive kinetic-attack mission orders. Lastly, should communications become degraded or denied by the enemy, redundant planning and execution capabilities, such as cloud computing, are critical to ensure continuity of operations based on the commander's intent and desired end states (i.e., mission-type orders), especially in a distributed operations environment.⁵⁹

After determining the types of sensors and communications, as well as the joint or coalition partners that will provide them, the CAOC C2 planners must then decide where to put them. There are many factors to consider, but sensor capability, availability, and geographic location (i.e., terrain) are at the top of the list. Ideally, planners would place both ground-based and airborne assets based on capability and proximity to the battle management area. However, host-nation permissions, the threat environment, and base support may drive less than optimal or tactically sound placement. Additionally, a viable joint C2 architecture must have redundant and backup capabilities that ensure continuity of operations and enable the JFACC to continue effective C2 of joint airpower in a partially or completely degraded environment. Col Matthew Smith, former commander of the 505th Test and Evaluation Group, emphasizes the importance of such continuity of operations: "The concept of mission command is critical to effective execution of the air campaign in a contested environment, and tools such as mission-type orders and cloud computing will leverage great benefits to ensuring continuity of operations in such an environment."⁶⁰ Moreover, the techniques and procedures developed to maintain the air campaign's continuity of operations in a contested environment will translate to facilitate maritime, land, space, and cyberspace operations.⁶¹ If a joint force—whether air, sea, land, or space based—is operating with dispersed elements in a contested environment, the concepts of mission command and the tools used to execute those concepts apply. Furthermore, these collective constraints placed on CAOC C2 planners will indeed drive the capacity for the joint force to execute distributed operations.

"Annex 3-30, Command and Control," indicates that "distributed operations occur when independent or interdependent nodes or locations participate in the operational planning and/or operational decision-making process to accomplish goals/missions for engaged commanders."⁶² In the case of split operations—a type of distributed operations—a single C2 entity such as the CAOC can be split up between multiple locations, but the single commander (i.e., JFACC) "should have oversight of all aspects of a split C2 operation."⁶³ This oversight allows the CAOC to conduct manpower-intensive tasks, such as developing the majority of the ATO at a rear or backup location while reducing the forward-deployed footprint.⁶⁴ Even if the CAOC is comprised of two or more forward locations instead of a rear and forward setup, the inherent redundancy allows for continuity of operations and makes it more difficult for the enemy to disrupt and degrade operations.⁶⁵

Additionally, as identified in the key consideration areas of coverage and connectivity, “Annex 3-30” highlights that “communications and information systems should provide a seamless information flow of prioritized data to and from forward and rear locations.”⁶⁶ Even though it is critical to maintain the appropriate level of centralized control, commanders must resist the urge to “take direct control of distant events and override the decisions of forward leaders,” especially given the degree and amount of information provided by modern communications and sensors.⁶⁷ In any case, the degree and effectiveness of C2 through mission command will hinge greatly on the commander’s leadership style and philosophy.

Philosophy of Command

Regardless of adherence to the concepts and principles of mission command and the effectiveness of the C2 architecture and systems used, the commander serves as the cornerstone of effective execution of mission command by setting the tone, communicating effectively, and leading by example.⁶⁸ Additionally, efficient communication of the vision, plan, or intent comes from a complete understanding of the problem and the tasks at hand. Similarly, productive communication skills are critical. Even if commanders fully comprehend the mission and guidance they want to provide, they must be able to offer clear, concise, correct, and effective communication. Without this skill, even the most fail-safe, perfectly analyzed, and expertly crafted plan can fall through the cracks created by poor communication and misunderstanding. Finally, it is the commander who establishes and builds that vital culture of trust without which mission command and effective air operations cannot succeed.

In terms of air operations, that trust is developed and cultivated through the JFACC and his or her staff. They provide opportunities that allow the tactical-level joint C2 commanders and units to exercise initiative and make decisions based on the situation/threat as it relates to their own specific battle management areas. Those commanders and units must be allowed to make mistakes and then learn from them. The quickest way to stifle trust and effective decentralization is to restrict those individuals and organizations from making decisions at their appropriate level, micromanaging them from above based on the sheer abundance of information and communications available, as discussed earlier.

There may be times, though, as Harvard observes, when specific direction and less decentralization are required, but centralized control and centralized execution should be the exception—not the norm—especially in a nonpermissive, degraded environment.⁶⁹ It is up to the commander to determine when and how he or she decides to empower the subordinate units, but that decision will certainly drive the willingness or reluctance of the tactical-level commanders to genuinely exercise disciplined initiative. Again, a solid foundation of trust is essential, and that trust must be developed and cultivated from the very beginning.

If the concepts and principles of mission command are to fully thrive in the joint air operations arena, the JFACC must (1) possess a command philosophy that parallels and supports the concepts and principles necessary to execute mission command, (2) adroitly communicate guidance and intent via multiple means (documents,

mission-type orders, etc.), and (3) promote disciplined and educated initiative on the part of subordinate commanders and units. Further, the productive implementation of mission command does not rest solely on the shoulders of the JFACC and operational- or strategic-level commanders. The brunt of the work and responsibilities lies with the tactical-level joint C2 units and commanders. It is their responsibility not only to train and educate their units but also to read and know all of the governing regulations, planning and execution documents, and daily guidance/intent sent from the JFACC. Only a thorough understanding of their responsibilities, compared to the intent and guidance provided, will allow the tactical-level units to give the JFACC the confidence required, while building a foundation of trust so essential to the effective execution of mission command.

Conclusion

To productively C2 joint air operations in today's contested and degraded environment while preparing for the volatile threats of tomorrow, the US Air Force and joint community must instill the concepts and principles of mission command in their culture. Doing so requires that operational-level commanders at the CAOC and tactical-level joint C2 commanders and units executing the joint air campaign first build and establish a vital foundation of trust. In addition, the operational-level commanders must create a shared understanding of the overall campaign objectives and offer well-defined, clear, and concise intent and guidance that the tactical-level commanders and units can leverage in order to exercise disciplined and educated initiative. Furthermore, the use of mission-type orders from the JFACC will facilitate decentralized execution and initiative in conjunction with the assumption and acceptance of appropriate risk. Lastly, it is critical to develop and employ effective C2 architecture systems and processes to lead joint air operations through mission command. However, it is even more essential that commanders develop and employ a philosophy that enables a vital culture of trust without which mission command and effective air operations have absolutely zero chances of success. ✪

Notes

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5. Joint Publication (JP) 3-0, *Joint Operations*, 11 August 2011, II-2.
6. Harvard, "Airmen and Mission Command," 136.
7. Curtis E. LeMay Center for Doctrine Development and Education, *Volume I, Basic Doctrine*, 14 October 2011, 69, <https://doctrine.af.mil/download.jsp?filename=Volume-1-Basic-Doctrine.pdf>.
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9. *Ibid.*
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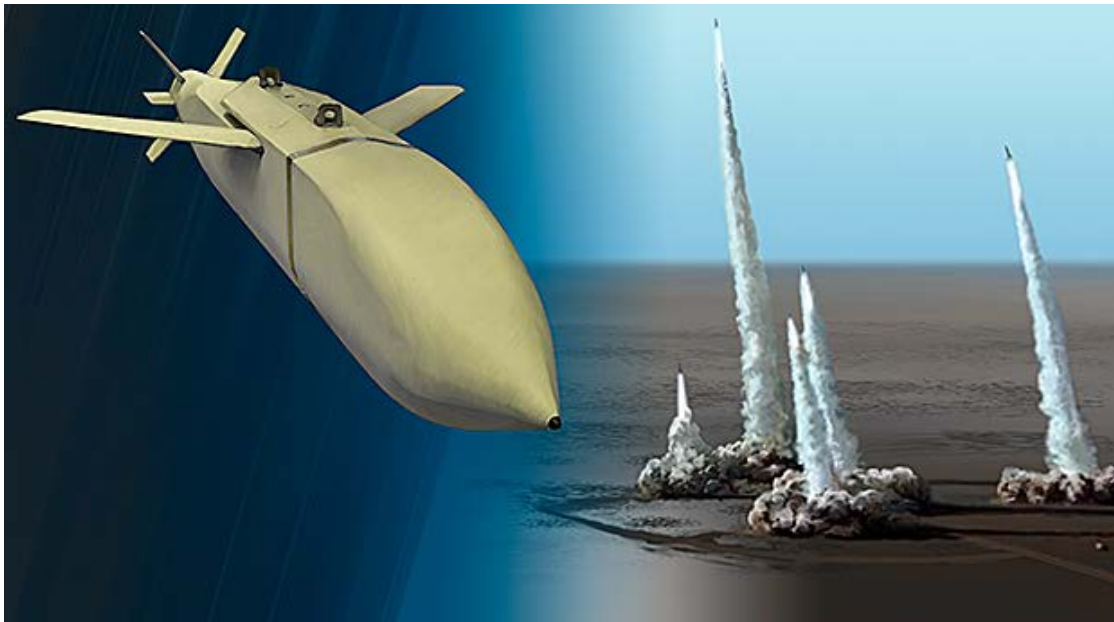
Flexible, Smart, and Lethal

Adapting US SEAD Doctrine to Changing Threats

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To gain total air supremacy in the modern age, air forces must not only render the enemy's air force ineffective but also contend with ground-based anti-air defenses. Over the past two decades, the United States has acquired unquestioned air dominance in every major conflict that it has fought. This unrivaled success has prompted other nations to reassess their strategies and has pushed the development of an antiaccess/area-denial (A2/AD) doctrine that has become central to these strategies. This doctrine relies on sophisticated long-range weapons

designed to deny an opponent access to their territory. Of concern to an air force, adversaries will possess more sophisticated integrated air defense systems (IADS). Such systems include missiles that can fly farther and faster than those of previous generations; radars that can direct these missiles to a target with devastating accuracy while remaining more resistant to jamming; and command and control (C2) functions that are more refined than their predecessors. Furthermore, all of these components have mobile capabilities, making them more difficult to locate and target.

US airpower has achieved a high level of success in recent years. Indeed, air dominance is all but taken for granted by American policy makers and the American public. This presumption of superiority has likely contributed to the current gap between existing suppression of enemy air defenses (SEAD) doctrine and the capabilities being developed by potential adversaries. Ironically, the recent successes of Western air forces against air defenses in Libya, Iraq, and Kosovo have been dangerously misleading because they have encouraged policy makers to consider only situations in which legacy fighters and dated tactics have prevailed against outdated IADSs. The United States has not yet encountered the newest generation of these systems in combat, and many projections about how non-low-observable (LO) aircraft and older tactics will fare against them are bleak. Currently, US joint SEAD doctrine has not adapted to meet air defense threats in an A2/AD environment. In light of the foregoing, one must raise the following question: Has the United States developed the optimum doctrine for defeating a modern IADS with minimum losses to friendly forces?

This article makes five assumptions: (1) the IADS in the A2/AD environment described here will be insulated against cyber attack; (2) the adversary will make every attempt possible to complicate his opponent's electronic warfare capabilities; (3) LO aircraft will be able to reach their weapons-employment zone prior to being engaged by the assets they seek to destroy, and non-LO assets armed with standoff weapons will be able to produce that same effect; (4) point-defense weapons around critical IADS components will not be able to reliably stop incoming weapons from destroying or degrading them; and (5) if ground radars emit, they can be detected and located by friendly forces.

Current US Doctrine for the Suppression of Enemy Air Defenses

Joint Publication (JP) 3-01, *Countering Air and Missile Threats* (specifically, chap. 4, "Offensive Counterair Planning and Operations"), currently guides US SEAD doctrine.¹ Although the document acknowledges many of the complications presented by a modern IADS employed in an intelligent manner, it does not go far enough in describing how US SEAD doctrine must change to counter these threats.

JP 3-01 provides a very broad analysis of a potential IADS but in doing so touches on many aspects critical to understanding the system's threat in an A2/AD environment. Chapter 4 indicates that enemies will likely employ a highly decentralized C2 system with built-in redundancies that will make targeting C2 functions much more difficult than in the past. Moreover, it specifically mentions how the mobility

of an IADS has made targeting more problematic through the use of deception and constant repositioning: “SAM [surface-to-air missile] forces have become more mobile and lethal, with some systems demonstrating a ‘shoot-and-move’ time in minutes rather than hours or days.”² This mobility will allow an adversary to significantly impede the ability of intelligence, surveillance, and reconnaissance (ISR) elements to find, fix, and track IADS components, thus slowing the entire kill chain. JP 3-01 also observes that a modern IADS will give “little warning prior to weapon engagements,” affording aircrews less time to react to a previously unidentified threat.³ Decreased aircrew reaction time will necessitate that plans become very fluid and able to shift on a moment’s notice.

The joint publication makes note of the elements necessary to defeat a modern IADS but does an insufficient job of tying them all together into an acceptable doctrine to counter the emerging A2/AD threat. For example, when discussing deliberate and dynamic targeting with regards to offensive counterair, it states that

OCA [offensive counterair] operations can be preemptive or reactive, and may be planned using deliberate or dynamic targeting. Missions using deliberate targeting are scheduled or on-call targets and included in the ATO [air tasking order] and rely on continuous and accurate intelligence to identify them at particular locations and times. Missions using dynamic targeting are unanticipated/unplanned targets, such as mobile TSTs [time-sensitive targets], that fall outside the ATO cycle and require immediate action. Minutes often define the timeline when these targets are vulnerable to attack. Those targets requiring immediate action cannot be effectively attacked unless responsiveness and flexibility is built into the targeting process and the ATO.⁴

Planning that incorporates decentralized execution is critical to any SEAD effort in an A2/AD environment because it allows the “target” and “engage” phases of the kill chain to be executed within the available temporal window. JP 3-01 correctly assesses the importance of deliberate on-call targets that will become the focus of any destructive SEAD measure in an A2/AD environment, and, as previously pointed out, “continuous and accurate intelligence” plays a crucial role. However, JP 3-01 does not offer an adequate synthesis of these concepts with regards to suppressing or destroying an IADS in an A2/AD environment.

The essential problem is that the document’s section on “Suppression of Enemy Air Defenses” provides only a cursory glance at SEAD problems and offers nothing more than vague guidance on how to solve them. It is critical to recognize that no conflict will be the same as another (therefore, doctrine will require a high degree of flexibility), but the threats posed by a modern IADS employed in an effective manner should merit the formulation of a doctrine dedicated to defeating them.

The three categories of SEAD that seek to reduce attrition and create “more favorable conditions for friendly air operations” are (1) area of responsibility / joint operations area (AOR-/JOA-wide) joint air defense system suppression; (2) localized suppression; and (3) opportune suppression.⁵ These categories, though still applicable in the A2/AD environment with regard to the desired effects of an air operation, do not adequately address the increased complexity of SEAD in this environment. The first category of SEAD—AOR-/JOA-wide air defense system suppression—“targets high payoff [air defense] assets that result in the greatest deg-

radation of the enemy's total system." The focus is on key C2 nodes associated with an IADS, having the intent "to destroy or disrupt the integration and synchronization of the enemy [air and missile defenses]."⁶ Because of increasing redundancies and the mobility of C2 capabilities in a modern IADS, this category will become much harder to implement in an A2/AD environment, at least in a timely manner.⁷ The second category of SEAD, localized suppression, is geographically confined to areas "associated with specific targets or transit routes for a specific time." Localized suppression is sometimes a subset of AOR-/JOA-wide air defense system suppression and is tied to the temporal domain as well as geography, making it relevant to an A2/AD environment; however, JP 3-01 does not discuss the more relevant elements of SEAD in such an environment.⁸ The third SEAD category—opportunistic suppression—acknowledges most of the challenges posed by the mobility of a modern IADS as well as the need for rules of engagement (ROE) and planning to optimize their engagement; however, the tone of the discussion implies that this form of SEAD is largely unplanned and reactive to threats.⁹ Reconciling the applicable elements of opportunistic suppression, as described in JP 3-01, with executing SEAD in an A2/AD environment calls for creation of a new category of suppression—one that combines the planned nature of localized suppression and the tactics of opportunistic suppression to become more proactive in engaging threats. As discussed here, this proposed new variant will be termed *planned opportunistic suppression*.

Such suppression would involve having on-station SEAD assets equipped to deal with threats known to be in the area—either unallocated threats or those likely to relocate between the time when plans are made and the mission is executed. Having SEAD assets available to engage threats as soon as they appear would add the inherent flexibility necessary to attack or suppress mobile targets that would probably move during the dynamic targeting process. For planned opportunistic suppression to be viable, flexible ROEs unique to SEAD would be necessary, and information would have to pass quickly from ISR assets to weapons platforms.

JP 3-01 identifies two alternatives for SEAD execution: destructive means and disruptive means. The former are explicitly defined as means that "seek the destruction of the target system or operating personnel," and disruptive means "temporarily deny, degrade, deceive, delay, or neutralize enemy surface [air defense] systems."¹⁰ Disruptive means are further subdivided into active and passive means.¹¹ Neither of these definitions mentions using assets to coerce IADS operators into a course of action favorable to friendly forces, such as not emitting or moving components around so frequently that they cannot be set up to engage friendly aircraft. If destructive SEAD is sufficiently effective, then IADS operators will likely conclude that the only strategy that ensures their personal survival is not to emit at all (depending upon the situation.)

As currently discussed in JP 3-01, SEAD resources seem to represent little more than a catch-all list of anything that could potentially contribute to the SEAD mission.¹² Although it is necessary for commanders and planners to recognize everything available to them, LO aircraft and standoff weapons deserve specific mention as SEAD resources because of their utility in an A2/AD environment.

The Capabilities of a Modern Integrated Air Defense System

In the past few decades, the US military has faced only legacy export Soviet-era IADSs manned by poorly trained crews. These systems had mostly static components that were easy to track and avoid. Furthermore, missiles could manage only short ranges (relative to modern systems), and almost every technical detail about them was compromised.¹³ The latest Russian and Chinese SAM systems—namely, the SA-10, SA-20, SA-21, and HQ-9—have missiles with greater range and maneuverability, upgraded radar systems, advanced data link and C2 systems, and the ability to pack up and move in a very short period of time.¹⁴ In addition, well-trained crews are no longer as critical to the operation of an IADS. Advances in automation and computer technology have made many of the formerly sophisticated tasks very simple to perform if not completely handled by a computer.¹⁵ The US military has yet to face an IADS with all of these attributes in combat.

The SA-21 Growler is one example of a system that will prove problematic to the US military.¹⁶ Designated the S-400 Triumf by the Russians, the SA-21 is a further development of the SA-20 and has improved on the latter's already formidable capabilities in almost every respect. The SA-21 and its previous iterations were designed specifically to deal with US strategies for countering them. The ability to resist electronic attack, track increased numbers of targets, defeat incoming precision-guided munitions, and detect smaller radar signatures were all features deemed critical capabilities during the designing of the SA-21.¹⁷

By incorporating redundant communication methods in its C2 infrastructure, one can place the SA-21's C2 components as far as 100 kilometers (km) away from the radars or missiles themselves and can communicate by means of radio or landline links, including analog telephone cables.¹⁸ The foregoing redundancies in communication make attacking these links, as outlined in current joint operational doctrine, extremely arduous.¹⁹ Further, "all system components are carried by a self-propelled wheeled all-terrain chassis, and have autonomous power supplies, navigation and geo-location systems, communications and life support equipment."²⁰ This increased mobility serves to further complicate efforts to target any of these components since any intelligence necessary is, in effect, useful only for as long as the asset can verify that the component has not been relocated.

The various missiles employed by the system can cover a number of ranges out to 400 km and altitudes as high as 30 km. Export variants of the system are intentionally designed to destroy "opposing standoff jammer aircraft, AWACS [Airborne Warning and Control System]/AWEW&C [Airborne Early Warning and Control] aircraft, reconnaissance and armed reconnaissance aircraft, cruise missile armed strategic bombers, cruise missiles, Tactical, Theatre and Intermediate Range Ballistic Missiles, and any other atmospheric threats, all in an intensive Electronic Counter Measures environment."²¹ Even if the system cannot perform as advertised, the extended range of its missiles will likely necessitate that high-value air assets are pushed further from the battlespace; more importantly, SEAD aircraft without LO characteristics or standoff weapons will be outranged.

In addition to the aforementioned capabilities, the system can be networked into older systems, thus improving their effectiveness. The 92N6 Gravestone engage-

ment radar utilizes computing power similar to that of Western active electronically scanned array (AESA) radars. Consequently, the Russians claim they can engage LO targets at greater ranges. The radar can track 100 targets in “track while scan” mode and six targets simultaneously for missile engagements. Equipped with a frequency-hopping radar as well as variable pulse-repetition frequencies and scan rates, the Gravestone was designed from the outset to defeat high-power active noise jammers. These radars and C2 components can also integrate with other IADSs, such as the SA-20.²² US SEAD doctrine should recognize the fact that an SA-21 or any system sharing similar characteristics can change situations significantly.²³

Proliferation of the Modern Integrated Air Defense System

Currently, Russia and China produce IADS components that are the most threatening to US aircraft, and both countries have expressed a willingness to proliferate these weapons all over the world. Although one may always debate the likelihood of armed conflict with either Russia or China, engaging with smaller regional powers or armed groups equipped with top-tier Russian and Chinese weapons is entirely within the realm of possibility, if not highly likely.²⁴ Regardless of who is confronted in a future conflict, the US military probably will find itself operating in an environment protected by an advanced IADS.

The United States has always sought to supply its allies with conventional arms as an instrument of foreign policy, and other states, including Russia and China, have done the same. Aside from economic gains, arms sales also foster relations between nations' militaries and ensure that allies are not placed at risk due to military transfers from an opposing power.²⁵ High-technology weapons sold by Russia and China are usually designed to counter US strategies and tactics, making them most desirable to countries that envision themselves in a future struggle with the United States. For example, China's much-touted A2/AD strategy relies on a sophisticated IADS and long-range, land-based weapons to prevent the United States from operating in areas near the Chinese coast.²⁶ As shown below, this same technology could be used by a different country to deny the United States access to its airspace, and the Chinese and Russians are all too willing to sell those systems to that nation.

A Congressional Research Service document entitled *Conventional Arms Transfers to Developing Nations, 2004–2011* points out that in the past decade, Russia and China have sold large numbers of weapons, including SAMs, to the developing world.²⁷ From 2004 to 2006, Russia ranked first in arms-transfer agreements to developing nations and second every year thereafter.²⁸ Most of these sales have involved sophisticated weapons such as missiles and aircraft.²⁹ From 2004 to 2007, Russia provided 6,340 SAMs to developing countries and 7,750 from 2008 to 2011.³⁰ China sold a considerably smaller number—only 530 from 2004 to 2007 and 780 from 2008 to 2011—but still a significant quantity compared to sales of Western countries.³¹ These figures, although not representative of either the quality or exact type of system sold, typify Russia's and China's willingness to proliferate anti-air weapons across the globe, whether for political or economic gain.

Even though the Chinese have not exported as many weapons as the Russians, they have supplied numerous missiles to developing countries but usually not entire missile systems.³² Their recent decision to sell HQ-9 SAM systems to Turkey is indicative of a possible change in policy.³³ More worrisome is how even in the face of concerns about reverse engineering, Russian president Vladimir Putin approved the sale of Russia's most advanced missile system, the S-400 (SA-21 Growler), to China. This action will only continue the proliferation of IADS technology and could allow China to threaten aircraft operating over Taiwan and the Senkaku Islands (both potential flash points).³⁴

Like the United States, Russia seeks to create additional long-term clients through a more flexible payment system and follow-on support for purchases. This support takes the form of "timely and effective service and spare parts for the weapon systems it sells."³⁵ In addition to technical support, Russia also offers training and expertise when it helps a customer set up an IADS, imparting tactics and doctrine to whoever is purchasing the system. These tactics, optimized for engaging LO aircraft, significantly increase the combat effectiveness of the party operating the system.³⁶

A contemporary example of the proliferation of advanced air defense technology is the prospect of Russia selling the S-300 (SA-10 Grumble) to Iran and Syria.³⁷ After originally caving in to pressure from the West, Russia decided against selling the S-300 to Iran; however, after a visit to Tehran by Russian defense minister Sergei Shoigu in January 2015, it appears that the delivery might take place after all. During the meeting, Shoigu mentioned that Russia might be willing to sell the more capable SA-21 as well.³⁸ Earlier, Russia had also attempted to sell the shorter-range Tor (SA-15 Gauntlet).³⁹ Although the Iranians rejected the offer, Moscow's desire to continue sales of SAM systems even in light of international pressure is further proof of its intention to make systems available to any government willing to pay. The Russians also planned to sell the S-300PMU-2 (SA-20 Gargoyle) to the Bashar al-Assad regime in Syria. For various reasons, the delivery was never completed.⁴⁰ Nevertheless, Russia's willingness to send advanced anti-aircraft weapons to such countries means that its most advanced systems will eventually proliferate to hostile governments.

Additionally, armed groups supported by a larger power can acquire advanced air defense weapons. Recently, separatist forces in eastern Ukraine allegedly have been sighted operating Russian Pantsyr-S1s (SA-22 Greyhound).⁴¹ These systems are among the most modern in the Russian inventory. If they are being operated by separatist forces or even by the Russians themselves, their presence indicates that the Russians are willing to provide their top-of-the-line technology to foreign factions when it suits their interest. SA-10s, SA-20s, or even SA-21s could be deployed for use in the Ukraine conflict or in similar fighting. The United States and allied countries could just as easily find themselves in a battle with an armed group supported by a newer IADS or even a system manned by troops of a larger power.

Three New Assumptions

Formulation of effective doctrine for SEAD in an A2/AD environment calls for making three major assumptions about the nature of the IADS threat. First, almost all IADS components will be mobile and linked together in a system with considerable redundancy. Second, any non-LO aircraft or aircraft not equipped with standoff weapons will be outranged by an IADS. Third, an IADS will be inherently resistant to jamming and electronic attack. These three assumptions will provide a realistic basis for any doctrine necessary to execute SEAD in an A2/AD environment.

The first assumption has serious implications for the find, fix, track, and target phases of the kill chain. During Operation Allied Force, Serbian IADS operators dispersed their SAMs and functioned in an emission-control mode, making them very difficult to locate and attack.⁴² Smart adversaries will have learned from previous American air operations and will structure their doctrine accordingly. For example, in contrast to the Serbian system, the Iraqi IADS during Operation Desert Storm was highly centralized and thus an easy center of gravity for coalition forces to target. Such control nodes, though hardened, were static and relatively simple to locate.⁴³ According to JP 3-01, “Fixed site, hardened facilities are usually easier to locate than mobile systems. Attacks against fixed sites can also be preplanned with appropriate weapons to increase the probability of kill.”⁴⁴ Enemies of the United States have observed these two scenarios and have modeled their doctrine and strategies to optimize their ability to deny America and its allies their desired end state.⁴⁵ For this reason, modern IADSs have been specifically designed with mobility as a key capability for all of their components. Moreover, one should assume that those systems will be employed in a manner to disrupt SEAD operations that attempt to destroy or suppress them.

In *Kosovo and the Continuing SEAD Challenge*, Benjamin Lambeth comments that in Allied Force, “one problem with such [destruction of enemy air defenses] attempts was that the data cycle time had to be short enough for attackers to catch the emitting radars before they moved on to new locations.”⁴⁶ To facilitate a shorter data cycle, one must have plans that allow for the rapid flow of information from ISR platforms and other information sources to strike platforms—and ROEs that allow those platforms to immediately engage threats as soon as they are located. The effects are twofold: (1) targets can be destroyed or significantly degraded, reducing the effectiveness of the system as a whole, and (2) given attainment of the first effect, the enemy is much more likely to limit emissions to prevent his system from being targeted. This tactic will produce the desired end state—specifically, the IADS will not be able to threaten friendly aircraft.

The mobility of IADSs means that the temporal domain will become more critical than ever. Ingress corridors that might have existed a few hours before may no longer be available as radars shift their location from the time they were located to when the strike package is scheduled to fly. Contending with this constantly changing air defense picture requires that an air tasking order incorporate a significant degree of flexibility.⁴⁷

The second assumption, that an IADS will outrange any non-LO aircraft not equipped with standoff weapons, will affect the engage phase of the kill chain. If an

aircraft can be engaged by a SAM well before it can employ weapons against it, then there is no reason for the SAM operator not to fire on the aircraft. This fact is especially true with higher-accuracy SAMs that have probability of kills as high as .9 against manned aircraft.⁴⁸ If SEAD aircraft cannot strike SAMs before being engaged themselves (especially with a 90 percent probability of getting shot down during engagement), then enemy IADS operators have no incentive not to hit friendly aircraft. This assumption invalidates current theory, which assumes that SEAD aircraft will be able to engage SAMs before being engaged themselves.⁴⁹ In order for these aircraft to remain viable means of destroying IADS components, they must be either LO aircraft or be equipped with standoff weapons to remain outside the weapons-engagement zone of the SAM.

Friendly aircraft can attack a modern IADS in two ways: (1) by either reducing the range at which they can be detected or (2) extending the range of their weapons (or some combination of the two). LO aircraft, though not invisible to radar, will restrict the range at which they can be detected and tracked by radar, particularly at the higher frequencies found in a SAM's fire-control radars.⁵⁰ Doing so will allow them to get close enough to employ weapons against an IADS without being engaged by it first—something that legacy fighters without standoff weapons cannot do. This assumption is significant because it severely restricts the airframes that can engage IADSs. It will also affect the total number of airframes available for other missions. For example, every F-22 tasked with destroying IADS components will be taken away from performing defensive counterair or strike missions. Alternatively, non-LO aircraft equipped with standoff weapons, such as the AGM-154 joint standoff weapon, will be able to strike an IADS before being engaged.⁵¹ But it is necessary to understand that regardless of the airframe or weapon tasked to conduct SEAD, that asset represents a military implement that could have been used for a different mission.⁵² The specific airframe or weapon itself is not as important as producing the desired end state. SEAD doctrine must recognize the threat posed by the extended range of a modern IADS and apply the best ideas for defeating it.

The third assumption, that an IADS will be inherently resistant to jamming, will reduce the effectiveness of current disruptive suppression methods, if not render them irrelevant. Modern ground-based AESA radars have capitalized on improvements in solid-state and advanced off-the-shelf technology, coupled with improved processing, to become capable of countering hostile jamming.⁵³ In addition, frequency-agile radars (those that rapidly change the frequency of pulses sent out) are next to impossible to jam. However, this statement is true only as long as the pattern is genuinely random.⁵⁴ For example, the Russian Nebo SVU acquisition radar, which can be networked into an SA-20 or SA-21 system, employs frequency agility, beam-steering agility, and fully digital processing to severely complicate efforts to attack it electronically.⁵⁵ If an adversary makes every effort to prevent electronic disruption of his IADS, it is entirely possible that destructive SEAD will become the only usable tool to either destroy IADS components or coerce them into not engaging friendly aircraft.

Recommendation for Changes to Doctrine

Given the three underlying assumptions discussed previously, the US military should revise its joint SEAD doctrine to contend with advances in IADS technology and tactics. First, countering mobile IADS components requires adding a category of planned opportune suppression to JP 3-01 with a focus on flexible ROEs and mechanisms in place to allow for rapid dynamic targeting. Second, countering out-ranged air assets necessitates formally acknowledging LO aircraft and standoff weapons as SEAD resources. Third, countering jam-resistant radars calls for making destructive SEAD the focus of SEAD efforts against a modern IADS. If that is the case, then doctrine should acknowledge the psychological effects of destructive SEAD. Finally, because the temporal dimension of air warfare is becoming more important, air superiority will become more localized and could possibly be attained only for brief periods; consequently, air parity might become the norm in future conflicts.

Adding planned opportune suppression to JP 3-01 would grant maximum flexibility in attacking mobile IADS components by concentrating the strategy on “planned on-call targets” as they are defined in the document.⁵⁶ Planned opportune suppression would necessitate flexible ROEs and channels to allow intelligence from any source, not just ISR platforms, to be collected, analyzed, and disseminated to the proper platform in time to take action, thus expediting the dynamic targeting process. This process will lessen the time needed to run through the entire kill chain in order to cope with the shrinking temporal window within which a mobile IADS can be engaged once it is located. This type of suppression can be applied at any level, from local areas to throughout the AOR/JOA. Because a mobile IADS will constantly change locations, rigid planning will not be sufficient for suppressing it.

LO aircraft and standoff weapons should be added to the “resources” category in JP 3-01.⁵⁷ Against the longer ranges of a modern IADS, legacy SEAD weapons and platforms will not be able to reach their intended weapon-employment zones before being engaged by modern SAM systems. Conversely, LO aircraft and standoff weapons will be able to destroy or degrade these assets without being struck themselves. If SAMs cannot attack aircraft consistently before coming under attack themselves, then the enemy will have to adopt tactics to protect his IADS (and thus prevent it from engaging friendly aircraft) or risk losing the system.⁵⁸ Either outcome will have the effect of preventing the IADS from engaging friendly aircraft. For these reasons, LO aircraft and standoff weapons need to be recognized as critical SEAD resources when one plans an operation in an A2/AD environment.

Destructive SEAD will become the focus of SEAD efforts in this environment. However, JP 3-01 should recognize that physical degradation of IADS components or their destruction is not the only way to suppress an IADS through destructive means. With regards to the psychological effects of physical destruction, a 2004 RAND paper comparing SEAD to game theory declared that “successful U.S. capabilities, especially with respect to attacks on time critical targets, will often have the effect of causing the enemy to become paralyzed. The right move will be no move.”⁵⁹ Successful employment of destructive SEAD against an enemy IADS will cause the adversary to react in a certain way based on how he is attacked. At some

point, effective destructive SEAD missions against an IADS will cause the enemy to alter his tactics to protect assets or risk losing them, thus forcing him to do nothing and producing the desired end state.⁶⁰ For this reason, JP 3-01 should devote more attention to the psychological effects of destructive SEAD.

Finally, if US assets are faced with an A2/AD threat, then air parity must become culturally accepted as the predominant level of air control. It is possible to attain limited air superiority in an A2/AD environment, but that situation probably will last only as long as the right assets are on station. An improperly supported strike package will become easy prey for an advanced IADS. Depending on the tactics used by an adversary, air superiority or air supremacy probably will not be attained until much later in the conflict—a scenario to which the US public and military are not accustomed. Moreover, carrying out operations in an A2/AD environment will require dedicating more assets to SEAD than would be necessary in other theaters. Although not the ideal application of air assets, such use of SEAD will likely be the only way of attaining the desired end state without unacceptable attrition of strike aircraft.

Good doctrine does not come from speculation alone. All of the foregoing claims should be tested in a safe laboratory environment, such as the Nevada Test and Training Range, before being granted the status of official doctrine. Such testing can verify the soundness of the doctrine without unnecessarily risking lives in an actual conflict.

Conclusion

As noted at the outset, the Department of Defense defines *doctrine* as “fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application.”⁶¹ The formulation of doctrine must not rely solely on past experience; it must be anticipatory as well. That said, changes to doctrine must still be verified by rigorous testing in a safe-to-fail environment. The modern IADS that will confront the US military in an A2/AD environment will prove fundamentally different than the system faced in previous conflicts. The mobility, extended range, and resistance to electronic attack of modern systems require the updating of US doctrine prior to performing combat operations in an A2/AD environment. To overcome these advances, joint SEAD doctrine must facilitate shrinkage of the time necessary to complete the kill chain against constantly moving IADS components. It can do so by creating SEAD-specific ROEs and establishing mechanisms that facilitate the rapid transfer of information to weapons platforms. One must further modify existing doctrine by formally recognizing LO aircraft and standoff weapons as critical resources for SEAD and giving destructive SEAD the central role in suppression of enemy air defenses. Taking a reactive approach to doctrine rather than a proactive one could cost war fighters their lives or impose unnecessary stress on planners attempting to tackle a situation for which current doctrine is inadequate.

Further research on updating SEAD doctrine could take different approaches to resolving a number of challenging issues. This article assumed that modern IADSs will be insulated against cyber attack—an appropriate assumption in a worst-case scenario but not necessarily true in an actual conflict. Even a closed network could

be attacked by a cyber weapon if an agent could covertly insert it into the system. Research concerning the integration of cyber weapons into SEAD doctrine deserves more attention. Furthermore, this article did not consider the possibility of using large numbers of remotely piloted platforms to overwhelm an enemy IADS. Many cheap, expendable systems could be a superior alternative to a few expensive manned platforms. Thus, employing large numbers of such aerial systems as SEAD assets is another area deserving of inquiry. In addition, researchers could examine the case for doctrine designed to degrade an enemy IADS by means of behind-the-lines attack, akin to the special operations teams employed in western Iraq immediately prior to the 2003 invasion that hunted down mobile Scud launchers.⁶² The use of space assets to suppress air defenses is another possible topic of study not addressed here. Finally, research at the classified level would include sources that this article could not draw upon, offering greater insight into possible ways of refining SEAD doctrine.

Utilizing unclassified sources, this article has included recommendations for revising current SEAD doctrine. Warfare is dynamic, and previously unknown factors can always affect planning at all levels; however, doctrine must make every effort to reflect changes in the military capabilities of potential enemies. The increasingly sophisticated prowess of the modern IADS is a case in point. Given these capabilities, revision of US joint SEAD doctrine deserves serious attention. ✪

Notes

1. Joint Publication (JP) 3-01, *Countering Air and Missile Threats*, 23 March 2012, IV-1, http://www.dtic.mil/doctrine/new_pubs/jp3_01.pdf.
2. *Ibid.*, IV-7.
3. *Ibid.*
4. *Ibid.*, IV-8.
5. *Ibid.*, IV-12.
6. *Ibid.*, IV-13.
7. Christopher Bolkcom, *Military Suppression of Enemy Air Defenses (SEAD): Assessing Future Needs*, CRS Report for Congress RS21141 (Washington, DC: Congressional Research Service, 24 January 2005), 3, <http://www.fas.org/man/crs/RS21141.pdf>.
8. JP 3-01, *Countering Air and Missile Threats*, IV-13–IV-14.
9. *Ibid.*, IV-14.
10. *Ibid.*, IV-13. Most of the disruptive means mentioned will be ineffective against a modern IADS.
11. *Ibid.*
12. *Ibid.*, IV-12–IV-13.
13. Carlo Kopp, "The Perfect Fighter: Does It Exist, Do We Need It, Can We Afford It?," *Flight Journal*, 16 July 2012, 46.
14. Lt Col Ralph J. Waite IV, "The Fragility of Air Dominance," research paper (Carlisle Barracks, PA: US Army War College, 2012), 16, <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA561936>.
15. Lt Col Michael Martindale, interview by the author, US Air Force Academy, 12 January 2015.
16. It is worth noting that the SA-21 is currently the most capable IADS used operationally and that although other systems possess similar characteristics (e.g., the SA-10), they are less capable.
17. Dr. Carlo Kopp, "Almaz-Antey 40R6 / S-400 Triumph Self Propelled Air Defence System / SA-21," Technical Report APA-TR-2009-0503, Air Power Australia, 27 January 2014, <http://www.ausairpower.net/APA-S-400-Triumpf.html>.
18. *Ibid.*

19. JP 3-01, *Countering Air and Missile Threats*, IV-13.
20. Kopp, "Almaz-Antey 40R6 / S-400 Triumph."
21. Ibid.
22. Ibid.
23. Since the Russians intend to export this system, their claims of its capability are likely exaggerated to a certain degree.
24. Benjamin S. Lambeth, "Lessons from Modern Warfare: What the Conflicts of the Post-Cold War Years Should Have Taught Us," *Strategic Studies Quarterly* 7, no. 3 (Fall 2013): 63.
25. Richard F. Grimmett and Paul K. Kerr, *Conventional Arms Transfers to Developing Nations, 2004–2011*, CRS Report for Congress R42678 (Washington DC: Congressional Research Service, 24 August 2012), 1, <http://www.fas.org/sgp/crs/weapons/R42678.pdf>.
26. Andrew Krepinevich, Barry Watts, and Robert Work, *Meeting the Anti-access and Area-Denial Challenge* (Washington, DC: Center for Strategic and Budgetary Assessments, 2003), 93.
27. Grimmett and Kerr, *Conventional Arms Transfers*. The authors make little mention of radars or C2 infrastructure to accompany these weapons, but it is highly likely that these components have been sold as well.
28. Ibid., 6.
29. Ibid., 9.
30. Ibid., 64. It is important to note that these numbers are not representative of either the quality of the missiles or the training of their operators and that they include all ground-based SAMs (everything from man-portable air defense systems to large radar-guided missiles).
31. Ibid.
32. Ibid., 10.
33. The HQ-9, like most Chinese weapons, is a reverse-engineered S-300. It more or less possesses the capability of an SA-20. Denise Der, "Why Turkey May Not Buy Chinese Missile Systems After All," *Diplomat*, 7 May 2014, <http://thediplomat.com/2014/05/why-turkey-may-not-buy-chinese-missile-systems-after-all/>.
34. Zachary Keck, "Putin Approves Sale of S-400 to China," *Diplomat*, 11 April 2014, <http://thediplomat.com/2014/04/putin-approves-sale-of-s-400-to-china/>.
35. Grimmett and Kerr, *Conventional Arms Transfers*, 6.
36. Igor Sutyagin, "Air Defence—the Opposite Side of Air Power" (paper presented at Chief of the Air Staff RAF Air Power Conference, Royal United Services Institute, London, 18 July 2013).
37. Jeremy Binnie, "Iranian Official Claims Progress of S-300 Replacement," IHS Jane's 360, 28 April 2013, <http://www.janes.com/article/12183/iranian-official-claims-progress-on-s-300-replacement>.
38. Thomas Grove, "Russia May Send S-300 Missile System to Iran—Media," Reuters, 20 January 2015, <http://www.reuters.com/article/2015/01/20/us-russia-iran-missiles-idUSKBN0KT1K420150120>.
39. Jeremy Binnie, "Iran Rejects Russia's Offer to Replace S-300 with Short-Range Tor," IHS Jane's 360, 11 June 2013, <http://www.janes.com/article/13625/iran-rejects-russia-s-offer-to-replace-s-300-with-short-range-tor>.
40. Jeremy Binnie, "Russia Cancels Syrian S-300 Deal," IHS Jane's 360, 13 August 2014, <http://www.janes.com/article/41819/russia-cancels-syrian-s-300-deal>.
41. Nicholas de Larrinaga, "Russian TOS-1 and Pantsyr-S1 Systems Reported in East Ukraine," *IHS Jane's Defence Weekly*, 4 February 2015, <http://www.janes.com/article/48685/russian-tos-1-and-pantsyr-s1-systems-reported-in-east-ukraine>.
42. Benjamin S. Lambeth, *Kosovo and the Continuing SEAD Challenge* (Santa Monica, CA: RAND Corporation, 3 June 2002), 2.
43. Thomas Withington, *Wild Weasel Fighter Attack: The Story of the Suppression of Enemy Air Defences* (South Yorkshire, UK: Pen & Sword Aviation, 2008), 150–53.
44. JP 3-01, *Countering Air and Missile Threats*, IV-5.
45. Krepinevich, Watts, and Work, *Meeting the Challenge*, i, 12.
46. Lambeth, *Continuing SEAD Challenge*, 6.
47. Alternatively, critical components such as C2 vehicles can be positioned in areas difficult to strike without an undesirable secondary effect (e.g., a mosque, crowded market, or hospital). Doing so would further complicate the targeting process because any attempt to destroy the IADS would either

have to be planned in such a way to mitigate the possibility of civilian casualties or accept the possibility of harming noncombatants.

48. Kopp, "Almaz-Antey 40R6 / S-400 Triumph."
49. Thomas Hamilton and Richard Mesic, *A Simple Game-Theoretic Approach to Suppression of Enemy Defenses and Other Time Critical Target Analyses* (Santa Monica, CA: RAND Corporation, August 2004), vii.
50. Rebecca Grant, *The Radar Game: Understanding Stealth and Aircraft Survivability* (Washington, DC: Mitchell Institute Press, September 2010), 39.
51. "AGM-154 Joint Standoff Weapon (JSOW)," Raytheon Company, accessed 11 March 2015, <http://www.raytheon.com/capabilities/products/jsow/>.
52. Despite the overlap between SEAD capabilities and strike (making it possible for an aircraft to perform both missions simultaneously), it is important to recognize that a weapon employed against one target cannot be used against another. For example, if a SEAD aircraft is suddenly tasked to attack an armored column, it will be unable to respond to an air defense threat that pops up later. The commander must be able to recognize the mission that has more value (a fact that, of course, will vary on a case-by-case basis).
53. Waite, "Fragility of Air Dominance," 18.
54. George W. Stimson, *Introduction to Airborne Radar*, 2nd ed. (Mendham, NJ: SciTech Publishing, 1998), 457-58.
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56. JP 3-01, *Countering Air and Missile Threats*, IV-10.
57. *Ibid.*, IV-13.
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59. *Ibid.*, 53.
60. One must acknowledge, however, that psychological effects are subject to many variables, such as how much the enemy values his IADS assets or how long either side believes that combat operations will last.
61. JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 8 November 2010 (as amended through 15 January 2016), 71, http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf.
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An Imperfect Understanding

The Air Force's Transition to Diversity and Inclusion

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According to Peter Brand, a character in the film *Moneyball*,

There is an epidemic failure within the game to understand what is happening. This is causing major league baseball teams to misjudge their players and mismanage their teams. . . . People that run ball clubs think in terms of buying players. Your goal shouldn't be to buy players; your goal should be to buy wins, and in order to buy wins you need to buy runs. . . . What I see is an imperfect understanding of where runs come from. . . . Baseball thinking is medieval; they are asking all the wrong questions, and if I say it to anybody I'm ostracized; I'm a leper.¹

The movie, based on a true story, details how Brand, a Yale graduate with a degree in economics, convinces Billy Beane, the general manager of major league baseball's

Oakland Athletics, to restructure his team to maximize its potential. Beane and Brand face staunch resistance and encounter many people who doubt the validity of their actions. Nevertheless, together they set a tone that encourages dialogue and challenges cultural beliefs, they articulate their strategy, and they build trust by being forthright; in the end, they are highly successful.

This change initiative bears striking similarities to the Air Force's current diversity and inclusion program. The service's senior leaders have determined that diversity and inclusion are requisites for effective operations, and in March 2015 they unveiled new proposals for increasing them within the Air Force.² Designed to strengthen the service, the nine diversity and inclusion initiatives should be a good thing. However, like Beane and Brand, these leaders face considerable resistance. Airmen are deeply concerned, and many of them have openly criticized the proposals.³ They have labeled these measures discriminatory quotas that will lead to preferential treatment and arbitrary actions that have little regard for second- and third-order effects.⁴ However, as in *Moneyball*, there seems to be an "imperfect understanding" of the problem in the Air Force, and the polemic nature of the topic dissuades serious, forthright discussion of the proposals.

This article does not advocate either for or against the diversity and inclusion policies. Rather, it seeks to help the Air Force transition in a way that unites Airmen instead of divides them. As mentioned above, many Airmen view these new initiatives as unfair and resist the proposed changes. For successful implementation, Air Force leaders need bottom-up support that requires (1) the right organizational tone to encourage dialogue, (2) a balanced strategy, and (3) a rebuilding of trust by addressing concerns of unfairness. The Air Force is a decidedly more complex organization than the Oakland Athletics; therefore, failure to implement the appropriate strategy could have consequences far more significant than a losing season.

The Right Organizational Tone

I refuse to accept despair as the final response to the ambiguities of history. I refuse to accept the idea that the "isness" of man's present condition makes him morally incapable of reaching up for the eternal "oughtness" that forever confronts him.

—Dr. Martin Luther King Jr.

The culture of today's Air Force is radically different than the one a decade ago. In 2012 Gen Mark A. Welsh, the Air Force chief of staff, spearheaded an initiative to expunge the service of discriminatory practices. Welsh aimed this initiative at strengthening Air Force culture. This sweeping action reinforced the service's zero-tolerance policy, and a number of high-profile firings let all Airmen know that permitting discriminatory behavior was unpardonable—a remarkable step in the right direction.⁵ Yet the Air Force still faces an uphill battle in the fight to become more diverse and inclusive.

The service recognizes the importance of diversity and is working to leverage it as a force multiplier.⁶ It defines diversity as "individual characteristics, experiences,

and abilities consistent with the Air Force Core Values and the Air Force Mission.”⁷ The Air Force’s diversity website outlines the concept as a composite of “personal life experiences, geographic background, socioeconomic background, cultural knowledge, educational background, work background, language abilities, physical abilities, philosophical/spiritual perspectives, age, race, ethnicity, and gender.”⁸ This definition creates some issues. Although it is relatively easy to track race, ethnicity, and sex, other facets of diversity (e.g., personal life experiences, geographic and socioeconomic backgrounds, etc.) are much more difficult to distinguish. Furthermore, in an increasingly diversifying culture, today’s relatively distinguishable categories such as race, ethnicity, and gender will become harder to capture in rigid categories. This conversation is necessary and pivotal since military policies are rapidly altering in response to changing American cultural norms, as evidenced by the movement towards lifting the ban on transgender troops.⁹

General Welsh proclaims that “the greatest strength of our Air Force is our airmen! The greatest strength of our airmen is their diversity! Each of them comes from a different background, a different family experience, and a different social experience. Each brings a different set of skills and a unique perspective to the team. We don’t just celebrate diversity . . . we embrace it!”¹⁰

Individuals from dissimilar backgrounds typically have had different experiences that shape who they are and how they think. Therefore, diverse organizations have an advantage when they effectively leverage different perspectives and ideas to provide a wider range of opinions.¹¹ With these palpable benefits, it may be easy to categorize people who are wary of diversity programs as closed-minded, racist, or sexist. However, understanding the different perspectives and addressing the legitimate concerns are essential if the Air Force diversity proposals are to gain broad support and have a lasting effect.

In their book *Assignment Pentagon*, Perry M. Smith and Daniel M. Gerstein capture a truism: that the “American military reflects the values, hopes, dreams, aspirations, weaknesses, and strengths of the American culture.”¹² As such, it is essential that the military remain representative of the larger American population. According to the 2010 census, minorities comprised 23.7 percent of the US citizenry.¹³ Furthermore, *2013 Demographics: Profile of the Military Community* reports that minorities accounted for 29.0 percent of the Air Force’s enlisted members and 18.9 percent of Air Force officers.¹⁴ These overall officer and enlisted ratios are fairly close to those of the population at large. However, a closer examination reveals a larger disparity in the higher officer ranks. Whereas minorities comprise 21.2 percent of O1s–O3s, they make up only 16 percent of O4s–O6s, and 5.9 percent of O7s–O10s.¹⁵

Some individuals have noted that this discrepancy assails good order and discipline by appearing to retain and promote at disparate rates.¹⁶ In response to this criticism, increasing the minority representation in the Air Force’s officer ranks has become a key tenet of the diversity and inclusion proposals. The service is addressing racial disparity through diversity proposals that raise the numbers of enlisted personnel selected for officer training school, by offering supplemental guidance to promotion boards, and through convening development team boards to “shape” career fields.¹⁷

Additionally, although the Air Force had seen a continuous increase in the percentage of females across the service until 2000, the ratio has plateaued over the last 15 years. In 2000, females made up 18.8 percent of the active duty force, and in 2014, 18.9 percent.¹⁸ Elevating these numbers is another key aspect of the diversity and inclusion program. The desired change in female applicants from 25 percent to 30 percent and the stated broadening of height-waiver access are squarely aimed at augmenting female accessions.¹⁹ Furthermore, a disparity exists between female retention rates and those of males. In 2014, female officers made up 23.6 percent of total officers but only 8.3 percent of flag officers.²⁰ Increasing deployment deferment time after pregnancy and allowing career intermission are efforts aimed at improving female retention rates.²¹

However, these measures have come under fire as unfair preferential treatment that discriminates against the majority.²² These troubling accusations are directed at the purported meritocratic foundation of the service. This critique is not new to American society. On the contrary, concerns about “reverse discrimination” and upsetting merit-based institutions parallel those found in the national bifurcation regarding affirmative action and related programs.²³

Stereotypes often portray military members as never questioning authority and blindly following orders. Those in the military understand that this stereotype is far from reality. It is true that military leaders can gain compliance through direct orders, but effective leaders know the importance of gaining buy-in and commitment from service members. Instituting cultural change is a significant challenge for the military, given the size of the organizations, rich histories, numerous subcultures, and entrenched value systems.²⁴ Servicewide commitment to reformed cultural norms will fully take root when individuals realize the value of the initiatives, but it cannot happen before oppositional members lower their defenses. Air Force leaders confront difficult tasks and must continue to make a compelling case to the service to demonstrate the benefits of these initiatives. Further, they must foster connection through mutual understanding with people reluctant to change.

To make a compelling case and build trust through connection, leaders must first address the current service culture. The organizational movement against discrimination in 2012 was highly effective—so effective, in fact, that it resulted in an overlooked second-order effect: the universally and explicitly acknowledged need to prevent discrimination, sexual harassment, and assault shapes the current debate about diversity and inclusion. It is understandably taboo to question antidiscrimination measures, especially since the service holds antidiscrimination in high regard. However, what seems to be occurring is a perception among Airmen that questioning the merits of the proposals equates to disputing the values of diversity and inclusion. Thus, Airmen who feel compelled to disagree with the proposals are doing so “off the record” on Internet blog sites. The choice to engage in “backdoor” objections and the view that Air Force leaders are unwilling to field concerns impede frank discussions and innovative stakeholder-generated solutions.

Most of the widespread concerns about the diversity and inclusion initiatives do not deal with whether they are good for the organization; rather, they address the details of implementation. Healthy dialogue that examines these concerns should

be encouraged. Without it, the service will be rife with ineffective followers who are dangerous to any establishment but are especially problematic for the military.

Dr. Robert Kelley, an expert on human productivity, has identified five basic followership styles: sheep, yes-people, alienated followers, pragmatists, and star followers.²⁵ The risk-averse culture shaped by the previous antidiscrimination efforts has resulted in far too few of what Dr. Kelley refers to as star followers and far too many sheep, yes-people, alienated followers, and pragmatists. The sheep blindly follow. The yes-people tell leaders what they want to hear. The alienated followers are frustrated but feel stifled by the climate, and the pragmatists stay out of the way.

The culture of tolerance and diversity, by nature, must encourage open discussions that ask hard questions and value differing perspectives. Communication and diverse opinions should be viewed as a strength in this process rather than a threat to the proposed change. By consciously eradicating trepidation and encouraging productive dialogue, Air Force leaders would discourage the sheep, yes-people, alienated followers, and pragmatists. Instead, they would encourage star followers, those Airmen who think for themselves and, when they disagree, offer constructive alternatives.

Encouraging productive dialogue and constructive alternatives is a key component of helping individuals deal with change. Famed author and organizational consultant Dr. William Bridges discusses this importance in his transition model, defined as “the three-phase [psychological] process that people go through as they internalize and come to terms with the details of the new situation that the change brings about.”²⁶ He sees transition as a largely internal process whereas change is the external event that “happens to people, even if they don’t agree with it.”²⁷ This model is uniquely suited to examine the Air Force’s evolution towards a more diverse and inclusive culture. In his model, Bridges identifies a continuum of three stages through which individuals progress when faced with change: “ending,” “neutral zone,” and “new beginning.”²⁸ The problem lies in locating individuals along this continuum and then actively guiding the organization towards the new-beginning stage.

Bridges summarizes the first stage, ending, as the feeling of loss and difficulty associated with letting go. The goal of leaders should be to help people deal with perceived losses so they can move on. The author’s neutral zone is the in-between stage characterized by chaos and confusion where “critical psychological realignments and repatterning take place.”²⁹ The leaders’ role is to help individuals mentally stuck in this stage by encouraging innovation. Finally, he characterizes his new beginning stage as the chapter that symbolizes renewal.

Bridges contends that people do not resist change so much as “the losses and endings that they have experienced and the transition that they are resisting.”³⁰ Therefore, Air Force leaders should examine who perceives to be losing what and address those issues. Furthermore, Bridges asserts that discussing “how healthy the outcome of the change will be” is unproductive.³¹ This notion helps explain much of the resistance faced by Brand and Beane of the Oakland Athletics and sheds light on why Air Force leaders cannot simply tell Airmen that things will be better under the new proposals.

Instead of talking about the positive result, Air Force leaders should deal with the losses and endings directly. To do so, Bridges details the following measures:

- Identify who is losing what.
- Accept the reality and importance of the subjective losses.
- Don't be surprised at "overreaction."
- Acknowledge the losses openly and sympathetically.
- Expect and accept the signs of grieving.
- Give people information, and do it repeatedly.
- Define what is over and what is not.
- Mark the endings.
- Treat the past with respect.
- Let people take a piece of the old way with them.
- Show how endings ensure continuity of what really matters.³²

By taking an honest look at and respecting the validity of the internal transition process, Air Force leaders can help guide individuals towards the desired end state. By ignoring the fact that Airmen are uneasy about these initiatives, they are in essence keeping the service in the neutral zone.

These leaders must recognize and understand the concerns of their Airmen, thereby breaking down barriers and moving them through the neutral zone. Doing so will set the necessary preconditions for leaders to encourage innovation and stimulate energy in their skilled Airmen. Complemented by the building of trust, discussed later, this "alliedness" can promote the new beginnings that Bridges envisions.

A Balanced Strategy

It perhaps comes as no surprise that people fear the loss of what they cherish in their particular identities—their race, their tribe, and perhaps most powerfully their religion. In some places, this fear has led to conflict. At times, it even feels like we're moving backwards.

—President Barack Obama

Designing an effective strategy to increase diversity and inclusion is not easy. Air Force leaders deserve praise for their current efforts and steps they have taken towards making this proposal a reality. Such an objective poses both adaptive and technical challenges. Ronald A. Heifetz and Donald L. Laurie define adaptive issues as "systemic problems with no ready answers" and no clear cause and effect

relationship.³³ Technical problems, though, are much more straightforward and therefore easier to solve.

Heifetz and Laurie warn leaders to fight the urge to provide solutions to adaptive problems. Instead, they recommend seeking inputs from a wide range of employees. As stakeholders, the employees will be taking on new roles, and many of them may be adopting new thinking, behaviors, and values.³⁴ Those who undergo the transformation will often see solutions not visible to senior leaders.

Moreover, cultural transitions that result in the questioning of one's cultural beliefs can be distressing. However, engaged leadership can mitigate this dilemma by encouraging bottom-up solutions.³⁵ Some people may argue that the Air Force is seeking input to solve these adaptive problems; however, as previously discussed, many Airmen are reluctant to voice their opinions and ideas. The rest, therefore, remain on the sidelines as sheep, pragmatists, or alienated followers.

In addition to resolving the adaptive problems posed by designing a comprehensive diversity and inclusion strategy, equally daunting technical problems also need addressing. Such issues call for a rational and analytical approach. The preponderance of the current program seeks to generate technical solutions, including much of the work the development team is doing—adjusting accession ratios and increasing enlisted personnel applications to the officer training school boards. Unfortunately, as mentioned above, some of these proposals have come under criticism for being discriminatory quotas.³⁶ This criticism echoes concerns that plagued the nation in the 1990s: “Adjusting for past discrimination against one group by counter discrimination against another group may result in a never-ending cycle of compensatory preferential adjustments.”³⁷ Air Force leaders must address this matter because “such a system will almost always be perceived as unfair by the members of those groups who are not currently granted preferential status.”³⁸

Regarding the second-order effect generated by the 2012 organizational movement against discrimination, a systemic shift has occurred that recognizes the value of diversity and opposes discrimination. This landscape, then, demands a diversity proposal that plays by different rules than those encountered in affirmative action programs. Rules that measure and promote people based on categories of difference (race, gender, sexual orientation, etc.) will always suffer under the aforementioned reverse-discrimination critique. That plan is not suited for the rapidly diversifying military. A cutting-edge institution such as the US Air Force needs an innovative diversity plan. The proposal here is a diversifying plan that recognizes people as people—not categories—and seeks to promote qualities and characteristics required to arm the nation for the changing nature of warfare.

This article explores how this plan can be instituted in response to the example of gender ratios. The stated diversity and inclusion goal of increasing female applicants from 25 percent to 30 percent is one of the many proposals that Airmen have criticized online because the Air Force can neither support nor provide technical data from which the “right” ratio was drawn. They have called the current ratio arbitrary.³⁹ This perception is one of the factors that prevents the organization from moving through Bridges's neutral zone.

In *The Feminine as a Force Multiplier*, Dr. Edith A. Disler provides insight into the “complementary characteristics of the masculine and the feminine” and the corresponding

strengths of each.⁴⁰ She argues that the character of war has changed and that to be successful in current and future conflicts, the military should embrace characteristics like empathy and intuition, which are predominantly feminine.⁴¹ Disler suggests that measurable differences exist between sexes and the possession of feminine and masculine characteristics.

Richard A. Lippa supports this claim: “On average men and women differ in a number of personality traits. When assessed in terms of the five-factor model of personality, men score higher than women on some extraversion facets (e.g., assertiveness, dominance) but lower on others (sociability, warmth).”⁴² Sociability and warmth, along with empathy, as Disler notes, are more highly correlated with females. Sociability, warmth, and empathy are important qualities that can bolster Air Force success in a changing culture of warfare.⁴³

The Air Force could use the evidence that Disler and Lippa speak to in a new type of proposal. All human beings possess a variety of masculine and feminine traits that lie along a continuum of strength. Therefore, if one were to plot the means of individuals along a continuum, then one would anticipate measurable differences. Plotting means for all individuals would make current dispositions for the service and for individual career fields readily apparent (fig. 1). By taking this matter one step further, one could then examine the “sweet spots” or areas along the continuum from which people are historically promoted into leadership positions (fig. 2). This purposeful reflection that examines historical dispositions would allow leaders to determine where deliberate adjustments may be necessary.

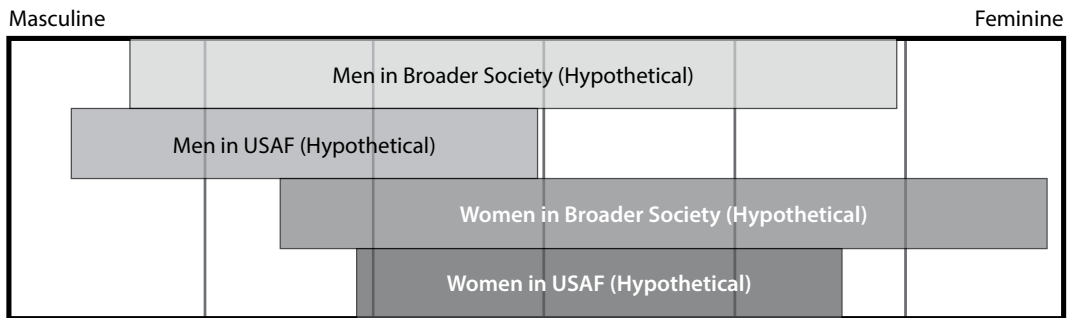


Figure 1. Example scale of personality. (This depiction is an oversimplification offered to promote a common reference from which to understand the model. The actual positioning along the continuum requires further analysis.)

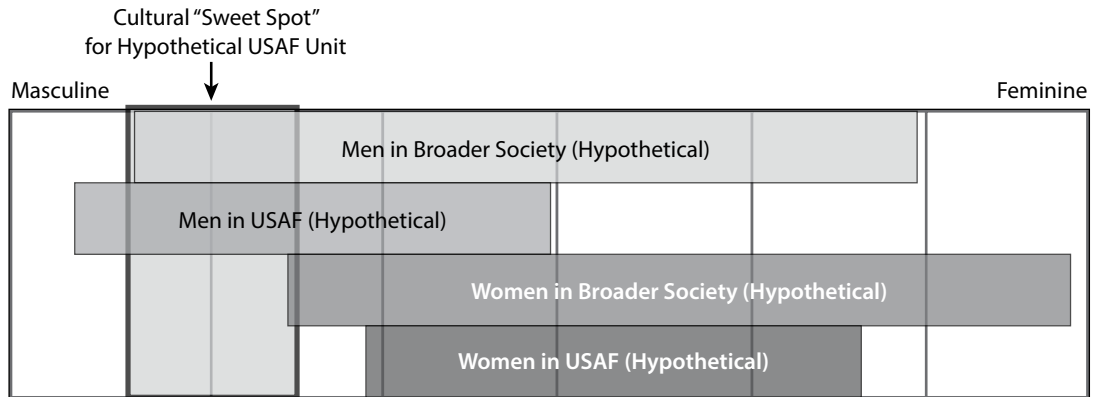


Figure 2. Example scale of personality with “sweet spot” added. (This depiction is an oversimplification offered to promote a common reference from which to understand the model. The actual positioning along the continuum requires further analysis.)

Having fact-based figures derived from demonstrated needs of qualities rather than arbitrary gut feelings helps validate the need for the accession changes. This approach would alleviate some of the criticism levied on the proposed initiatives and provide a number of options—for instance, sweet spots can be deliberately shifted, widened, or validated to meet demonstrated need (fig. 3). Additionally, identifying the trends will enable more effective mentorship and grooming for individuals outside the historic sweet spot.

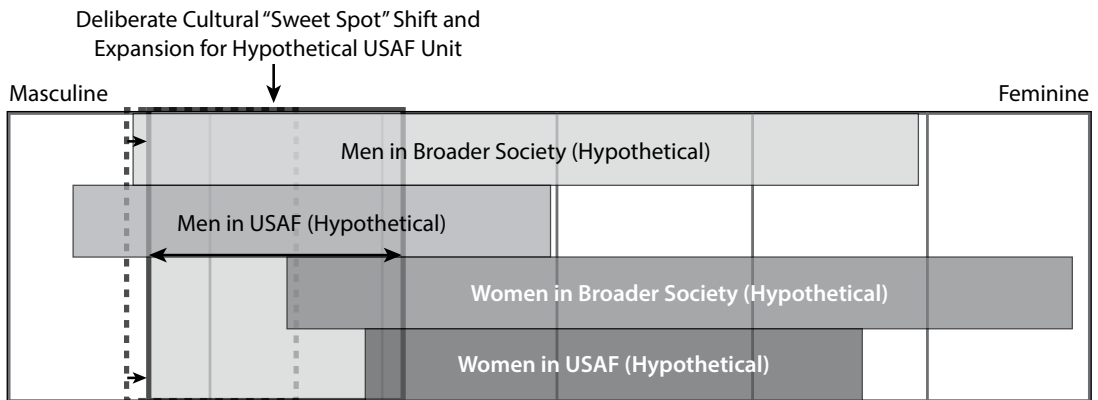


Figure 3. Example scale of personality depicting shift and expansion of “sweet spot.” (No change to the sweet spot may be required, but if it is necessary, this tool provides leadership a systematic approach. This depiction is an oversimplification offered to promote a common reference from which to understand the model. The actual positioning along the continuum requires further analysis.)

This is not to imply that all career fields should have the same mix of these masculine-feminine characteristics. Few people would argue that different attributes or sweet spots should not be expected, based on career fields and associated duties. For example, one would expect terminal air controllers to have a different sweet spot than acquisitions engineers, whose sweet spot would presumably be different from that of space systems officers. Admitting this fact is an important step towards having a productive discussion on the topic.

Furthermore, the existence of a clear male-to-female ratio does not guarantee that those individuals will possess the desired masculine-feminine traits in abundance. Therefore, one cannot guarantee unit effectiveness purely by sex-composition ratios. However, these ratios do offer a starting point from which to examine the problem.

An additional challenge then becomes deciding who should determine the desired sweet spot adjustments. Senior leaders would have a difficult time doing so without collaborative input, which, at a minimum, would have to come from respected leaders within each career field and career field management. However, conducting a study to help set and hasten the cultural acceptance of career-field sweet spots would reduce the chances of perpetuating old biases.

Examining sweet spots is an option for devising a technical solution to one of the many diversity and inclusion challenges, but it is not enough. Encouraging productive dialogue is essential to stimulate more bottom-up technical and adaptive ideas, which are necessary if the Air Force wishes to achieve a balanced strategy that helps bring the service together.

Rebuilding Trust

The authors of the article “Designing Trustworthy Organizations” explore the causes and possible methods of preventing trust failures:

In examining trust failures, we have found that one type of incongruence that frequently led to widespread loss of trust was the development of a company strategy . . . that either accidentally or deliberately favored the interests of one stakeholder group while betraying those of others. . . . To be sure, it is not uncommon for organizations to favor some stakeholders' interests over those of others. Rather than simply prioritizing certain groups, however, a trust betrayal occurs when the organization actively caters to a group (or groups) but fails to uphold responsibilities to others.⁴⁴

Interestingly, this passage describes many of the concerns levied in opposition to the Air Force's diversity and inclusion initiatives. The service's 2013 *Diversity Strategic Roadmap* asserts that “we intend to achieve these goals as a meritocracy, ensuring a level playing field for all.”⁴⁵ However, to some individuals, the 2015 diversity and inclusion proposals seem to conflict with this premise.⁴⁶

Robert F. Hurley and his colleagues suggest a framework that may be useful in assisting Air Force leaders address concerns and restore trust. They argue that people consider six signals “when deciding whether to trust a person, group, or organization”:

1. Common values: Does the trustee share our values and beliefs?
2. Aligned interests: Do the trustee's interests coincide rather than conflict with ours?
3. Benevolence: Does the trustee care about our welfare?
4. Competence: Is the trustee capable of delivering on commitments?
5. Predictability and integrity: Does the trustee abide by commonly accepted ethical standards (such as honesty and fairness), and is he or she predictable?
6. Communication: Does the trustee listen and engage in open and mutual dialogue?⁴⁷

A comprehensive strategy to rebuild trust based on aligned values, interests, benevolence, competence, predictability, integrity, and communication should be part of the Air Force's diversity and inclusion initiatives. Designing such a strategy will not be easy, but tackling the issues head-on is a sine qua non for widespread commitment to the program.

Senior leaders have made the *first step*, addressing *common values*, a priority, as demonstrated by the following statement in the *Diversity Strategic Roadmap*: "Our core values of integrity first, service before self, and excellence in all we do, along with a tradition of innovation, compel us to ensure that diversity remains a priority."⁴⁸ Anchoring discourse around these core values supplies something to which all Airmen can relate.

The *second step* is to continue to show how diversity and inclusion are *aligned interests* of the entire service. However, complete cultural acceptance will happen only after individuals experience the tangible benefits. Therefore, actions consistent with the initiatives are paramount, and tangible victories should be celebrated.

The *third step*, showing *benevolence*, is multifaceted. Not only do leaders have to demonstrate that they are deeply committed to the success of minorities and females but also they must show the same regard for nonminorities and males. Treating all stakeholders equally will engender trust and result in commitment to the program.

The *fourth step*, showing *competence*, will prove difficult but is far from impossible. To demonstrate this competence, leaders must first analyze and then communicate the second- and third-order effects of the policies. For example, what is the effect on males and females without children if mothers receive a 12-month reprieve from deploying after childbirth? What is the second-order effect on nonminorities and males with regard to accession, retention, and promotion? Addressing these concerns is important since they have a genuine impact on Airmen. In the end, the return should outweigh the cost. Ultimately, performance will demonstrate competence. The initiatives must either produce the desired effects or be changed.

The *fifth step*, *predictability and integrity*, relates to concepts discussed in the previous paragraph. The service claims to be a meritocracy, but many individuals maintain that the diversity proposals affect this merit-based system.⁴⁹ Leaders should confront such concerns directly. For example, how does a promotion board determine that someone has demonstrated that he or she will "nurture and lead in a diverse and inclusive Air Force culture" when performance reports do not specifically address this issue?⁵⁰ Will the diversity and inclusion initiatives result in discriminatory promotion standards?⁵¹ Will increasing the applicant pool for certain groups result in a reduced effort to recruit highly qualified individuals who are not in those groups?⁵² Will the policies result in quotas that grant preferential

treatment?⁵³ These repeatedly voiced questions warrant addressing in order to reestablish predictability and demonstrate integrity.⁵⁴

Finally, the *last step, communication*, is key to establishing trust. As previously discussed, leaders must openly address the benefits and costs of these proposals. Frank modeling of this skill can serve as an invitation for servicewide discussion and debunk the perception that concerns are not tolerated. Next, leaders must listen to and address concerns directly with openness and honesty. Doing so has the potential to establish a climate that not only follows orders but also welcomes dialogue and innovative solutions from Airmen of all ranks, career fields, races, ethnicities, sexes, and religions.

Conclusion

The United States of America has helped underwrite global security for more than six decades with the blood of our citizens and the strength of our arms. The service and sacrifice of our men and women in uniform has promoted peace and . . . enabled democracy to take hold.

—President Barack Obama, 2009

President Obama has made some poignant statements that directly relate to the diversity and inclusion debate. He notes the important role that the US military fills in the world. However, he also warns that “we lose ourselves when we compromise the very ideals that we fight to defend. And we honor—we honor those ideals by upholding them not when it’s easy, but when it is hard.”⁵⁵ A substantial number of the ideals we fight to defend include the belief that men and women of all races, ethnicities, religions, and sexual orientations should be treated with respect and be afforded the same opportunities for success.

The Air Force’s 2015 diversity and inclusion initiatives seek to uphold these ideals. However, as with any cultural transition, challenges arise. This cultural shift must maximize inclusion and diversity and thereby increase combat efficacy. The current program is a well-intentioned attempt to leverage the strength that diversity affords. To keep the service on “glide slope,” leaders must promote an Air Force climate that encourages open dialogue, they must ensure that the strategy is balanced and reflective of the adaptive and technical aspects of the problem, and, finally, they must reestablish trust with all Airmen by addressing concerns head-on. Together, these measures will help alleviate the “imperfect understanding” of the problem and facilitate the Air Force’s transition towards a more diverse and inclusive culture. 🌟

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Leading the Development of Concepts of Operations for Next-Generation Remotely Piloted Aircraft

Capt Curtis G. Wilson, USAF*

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The clear precursor to fundamental changes in tactics, technology, and community norms is the design of new concepts of operations (CONOPS). Development of a CONOPS is a low-cost activity, but it has the power to change the direction of an entire enterprise. The current CONOPS for medium-altitude remotely piloted aircraft (RPA) in which the Air Force is deeply entrenched has

driven budgets, manpower, requirements, and technological development for nearly two decades. To enable progression, the Air Force must reform its philosophy of how it procures RPA technology. Despite a fiscal environment that is prohibitive for development of an entirely new next-generation RPA system, the service can use existing assets to realize a vast improvement in capability through changes in software architecture and digital data-linking of RPAs. An open-architecture RPA system can harness the natural rate of technological progression in industry and reverse the currently defunct RPA acquisition process, wherein new technology drives requirements, back to a state of requirements driving technological development. Only then can the Air Force resume its responsibility to lead industry in the development of RPA technology and break free of a sole-source paradigm.

Definitions

A CONOPS is a written statement or graphical depiction that clearly and concisely expresses what the joint force commander intends to accomplish and how it will be done using available resources.¹ Today's prevalent RPA CONOPS can be defined as *analog control by a pilot and a sensor operator of an armed aircraft for a 24/7 combat air patrol to support combatant commanders with armed reconnaissance of time-sensitive targets*. Remote split operations (RSO) is a subset of this CONOPS, requiring launch-and-recovery and mission-control elements to allow nondeployed personnel to conduct the combat sorties.

Requirements are broadly defined capabilities that must be available to execute the overarching CONOPS. RPAs must provide full motion video and signals intelligence (SIGINT) capabilities to fulfill their intelligence, surveillance, and reconnaissance role for combatant commanders. They have to be armed to react kinetically to fleeting targets, and they must do so 24 hours a day. Thus, requirements start with meeting a needed mission capability, allowing multiple solution options, and potentially capturing the creativity/efficiency of industry and joint partners. Defined requirements are then broken down to second- and third-order parameters and attributes that are the basis for purposefully engineering the system. With the aforementioned requirements, designers of today's RPAs selected high-aspect ratio wings and efficient motors for long endurance, hard points for weapons, and a data bus to integrate a Multi-Spectral Targeting System and other sensors.² Theoretically, everything from software to aircraft design to command and control should trace back to, and be justified by, a requirement.

The earliest antecedents of what the Air Force now terms RPAs originated just prior to World War One; however, only in the last 20 years has the RPA's potential in the context of transnational security challenges become readily apparent.³ The development of RSOs allowed the intelligence community to control reconnaissance platforms in real time anywhere on the globe. These operations, combined with highly fuel-efficient aircraft, offer an unprecedented level of persistence that remains the primary advantage of the RPA. In 2001, when Big Safari—the Air Force's program office charged with rapid development, procurement, and fielding—launched the first Hellfire missile from an MQ-1 Predator, the armed scout CONOPS

was born, shaping the face of the modern RPA enterprise.⁴ The emergence of that CONOPS is a brilliant success story in the Air Force's acquisition history. Combatant commanders recognized the necessity of the previously exclusive intelligence, surveillance, and reconnaissance aircraft kinetically reacting to the targets it had located. A shotgun acquisition and capabilities implementation followed, but this success story was the last of its kind for the medium-altitude RPA enterprise.

Paralyzed by Success

The development of RPA CONOPS stagnated in the early 2000s, but the Predator's early triumphs outshined any concern for the need of further evolution. General Atomics Aeronautical Systems Incorporated (GA-ASI) production reached full capacity, combatant commanders had an insatiable demand for this new breed of capability, and phrases like *Pred porn* and *drone strike* became household terms.⁵ Cameras improved, a variety of accessories hung from the wings, and the follow-on MQ-9 Reaper emerged to carry even more equipment. For a system at the developmental stage of advanced-technology demonstrator, the Predator was quite possibly the largest and fastest asset acquisition in Air Force history. It seemed to represent a dream come true: the service got a whole fleet of aircraft systems without paying the time or money bills for the laborious and bureaucratic acquisition process. However, the hidden costs and consequences of this approach manifest themselves throughout the asset's service life. The Predator arrived in the active Air Force inventory as a rapidly procured prototype lacking any standing requirements and including its own implicit CONOPS. The early performance of the system led to an explosion in production that the Air Force was then charged with managing. An asset designed with the intention of limited covert use suddenly faced oversight and standards endemic to a multi-billion-dollar military acquisition program.

GA-ASI, a fledgling company only a few short years before, had to adhere to government oversight and standards for airworthiness, production, safety, sustainment, software, and training, all of which are substantially time consuming, expensive, and not part of the original contract for the system.⁶ The rapid procurement of the Predator and Reaper system led to its classification as experimental in terms of airworthiness, an inefficiency that forced a need for certificates of authorization issued by the Federal Aviation Administration anytime the Air Force wished to transit through the national airspace. This practice limits RPA systems to tight corridors between bases and military operating areas to keep them safely separated from civil aviation. The initial intent of the system for limited covert use in military-controlled airspaces did not require developmental test and evaluation documentation necessary for a Title 10 airworthiness certificate. Now that the Predator and Reaper have moved from covert to more conventional use, the Air Force is facing greater need for standard airworthiness certification. The Predator and Reaper program office has responsibility for future production and retroactive contracts—that is, the service now spends millions of dollars to generate developmental test and evaluation documentation to prove airworthiness for a system with over two million flight hours! Beyond the obvious and seemingly nonsensical insistence from the acquisition

process to document for the sake of documentation, the Predator program had two distinct effects. First, it did succeed in providing weapons, sensors, and a follow-on airframe that significantly improved the utility of the original Predator A and brought the armed scout CONOPS to full maturity. Second, it secured the future of GA-ASI as the Air Force's sole-source provider for manufacturing, sustainment, and future development.

Air Force efforts to write requirements that could evolve the armed scout mission and begin to break free of the sole-source paradigm have been unable to move forward. For example, an operational RPA squadron was tasked to implement a GA-ASI proprietary multi-aircraft control system, but its attempts were unsuccessful.⁷ The Air Force could not compete the requirement on the open market because of software licensing restrictions, thus forcing the service either to purchase the GA-ASI solution or face the seemingly insurmountable cost of buying out proprietary software rights. The fate of the multi-aircraft control system was further exacerbated when it was employed by a squadron in "surge" state. The result was an abbreviated syllabus that did not allow operators to gain enough experience with the system to use it skillfully. Ultimately, the initial cadre of pilots with limited experience abandoned the system because they did not "trust" it and because their burden of operations did not give them the time required to employ it properly.⁸ The following analogy best describes the present state and potential future of the medium-altitude RPA enterprise:

Imagine a group of men cutting their way through a jungle with machetes. They're the producers, the problem solvers. They're cutting their way through the undergrowth, clearing it out. The managers are behind them, sharpening their machetes, writing policy and procedures manuals, holding muscle development programs, bringing in improved technologies and setting up working schedules and compensation programs for machete wielders. One day a man climbs the highest tree, surveys the situation and yells, "Wait! We're in the Wrong Jungle!" But how do the busy efficient producers and managers often respond? "Shut up! We are making progress."⁹

The Air Force worked diligently to meet the ambitious 65 combat air patrol demand set by the secretary of defense.¹⁰ Some of the Air Force's best tacticians have eloquently formulated and distilled stunningly brilliant tactics, techniques, and procedures (TTP) to enable the Predator to perform operational tasks and entire mission sets that the system's designers never imagined. The Predator program office is engineering block upgrades full of improvements, fixes, and new technologies.¹¹ Several Reserve and Guard units convert from legacy airframes to RPAs every year. The Air Force developed an entirely new pilot training program to teach officers how to fly the Predator and Reaper.¹² An entire career field has been established, centered on the GA-ASI-branded medium-altitude RPA enterprise. But all of these advancements are still just polishing the same two-decades-old CONOPS, feeding the sole-source paradigm, and cutting deeper and deeper into the wrong proverbial jungle.

The military research and development (R&D) community has danced around the next-generation RPA CONOPS through technology demonstration for several years. Individual programs have developed key enabling technologies such as sense and avoid, automated aerial refueling, man-to-machine interfaces, machine-to-machine

interfaces, multi-aircraft control, and autonomy.¹³ All are fragments of requirements of a future CONOPS. The key mistake has been to focus on these individual technologies and attempt to apply them to the armed scout CONOPS. Why have all of these technologies not made their way into the Predator or Reaper systems? The sole-source paradigm makes innovation difficult because even when the contractor enjoying the monopoly legitimately offers new functionality, service culture can still reject it without explanation. This practice is a manifestation of the danger of not having a clear CONOPS to drive government requests to the market, instead having the market proffer features and functionality.¹⁴ Specifically, something as straightforward as auto takeoff and land (AT&L) has yet to be implemented on Air Force Predators and Reapers even though the Army has successfully employed AT&L on the GA-ASI-produced Grey Eagle system for years. The RQ-4 Global Hawk almost exclusively utilizes the feature, and the Navy's X-47 is making autonomous landings on aircraft carriers.¹⁵ According to Gen John P Jumper, former Air Force chief of staff,

We have allowed the pilot culture (fly the vehicle) to dominate what should have evolved into technologies that minimize the need for individual aircraft control. We should be trying to maximize the larger effects of automated flight and sensor functions, allowing the grouping of air vehicles when appropriate, developing more advanced mission planning software and enabling automated mission execution. . . . What has evolved is an RPA world that continues to be overly concerned with input rather than the output, persisting with more-than-necessary man-in-the-loop, and less than necessary integration of sensors and machine-to-machine capabilities automated for mission success. It is only logical that the next generation mission effectiveness will strive to fully develop the spectrum of RPA capabilities most valued by commanders, shift to an output, mission oriented doctrine and allow automation to ease the emerging burden on manpower, training, bandwidth management, etc.¹⁶

John Boyd warned of the dangers of a culture that clings to an outdated standard. His paper "Creation and Destruction" describes how organizations that adhere to standards and concepts which rule constituent elements will progress to a state of disorder as new elements are added to the domain.¹⁷ In other words, an organization that adheres to one particular CONOPS without the ability and foresight to assess, strategically forecast, select, and formulate an appropriate CONOPS for the situation—and then drive action—will see an increasing level of complexity and confusion in their TTPs as new perceptions and technologies emerge. According to Boyd, the only way to escape this slide toward entropy is to allow the concept to collapse by abandoning the old standard and permitting the emergence of a new domain by finding common attributes and qualities among the constituents of the former standard and creating a new standard. Put concisely, an organization eventually has to abandon the old CONOPS and leverage emerging TTPs and technology to form a new one. The alternative is to face an ever-increasing state of complexity and confusion while trying to integrate new technologies into a construct in which they do not fit.

Casting a Vision

Intuitively, developing a new CONOPS sounds like an investment of years of work and billions of taxpayer dollars, particularly at the mention of a word like *autonomy*—but that is hardly the case. The cost of a CONOPS is critical thinking more than anything else. Such concepts are ways of reasoning to produce guidance that can drive requirements which in turn lead to technological development. Budgets for technology development have already been executed (e.g., AT&L, sense and avoid, etc.), but the concept of how the Air Force employs these technologies (i.e., input over output) is the limiting factor that needs to be reformed.¹⁸ Air Force leadership must turn the RPA enterprise around from contractor-developed technology that drives requirements and CONOPS to having the service lead technology through defined future CONOPS and subsequent forward-looking requirements. The alternative is to remain locked in the sole-source paradigm for the foreseeable future.

As an example of a proper flow from forecasting and strategizing to CONOPS development to technical design, consider autonomous mission planning and execution (AMPLEX). In this notional design, a mission director tells the AMPLEX system a set of objectives, and the system generates a multi-aircraft sortie flow with accompanying mission routing for review. The director approves, and the system autonomously executes and adjusts in real time to manage allowable performance deviations. The difference between AMPLEX and today's RPA employment is that the operator is a "human *on* the loop," not a "human *in* the loop." Although this description may appear simplistic, that is precisely the purpose of a CONOPS: to effectively articulate the key facets and avoid becoming entrenched in technical or tactical details. It is the on-ramp back onto the highway of technological progression and the right proverbial jungle to begin cutting through.

A CONOPS like AMPLEX would inform and orient requirements, and requirements would drive technological development, resetting the government-industry relationship to one of government leading industry. The technological pillars of an AMPLEX CONOPS already exist in higher-technology readiness levels than the Predator's systems when it was first deployed; however, adoption of the approach has stagnated because these technologies are difficult to integrate into a proprietary, closed technical ecosystem that dominates the armed scout CONOPS.¹⁹ Initially, AMPLEX can be realized without upgrading any major hardware, without building new aircraft or facilities, and by utilizing the command and control infrastructure already in place. The stumbling block is the sole-source paradigm: monopolistic control of the software architecture and a laborious software update process that would otherwise not survive open-market competition. Software, more specifically ground control station (GCS) software, is pivotal in redefining modern aircraft capabilities, and it is the major element of change that the AMPLEX CONOPS would drive.

There are a multitude of self-inflicted barriers to this level of innovation, including RPA community perceptions, disconnects between operational and R&D entity efforts, and subtle incentives for leaders within the community to maintain the status quo rather than foster a culture of innovation. The tendency among experienced RPA operators is to quickly reject the prospect of autonomy. A standard concern is that

the crew will become overly dependent on autonomous aids that in turn will lead to poor preparation to execute complex mission sets if the autonomous features ever become unavailable. This argument communicates a valid concern from a near-term point of view, but from a mid-to-long-term perspective, it is historically accurate to say that reliance on technology for enhanced mission success is a gradual process of rejection, caution, acceptance, and, eventually, dependence. Currently, while performing cognitively demanding maneuvers, aircrews are utterly dependent on autopilot functions such as the stability augmentation system and autopilot hold modes. Stakes would have to be very high to consider an RPA for continuous use in collection or weapons employment while autopilot functions were malfunctioning, yet people who fear more advanced automation ignore the reality of their present dependence. Similarly, the community utilizes a host of supporting software that practitioners deem vital for flight safety, mission management, and validation of the weapon employment zone. Aircrews are allowed to depend on autopilot and peripheral tools because they have proven highly reliable over a large swath of the system's more than two million flight hours and greatly aid effective accomplishment of the RPA mission.

The vision and achievements of the R&D community have advanced so far beyond current operational capabilities that crews get discouraged when they become aware of the wonderful options that already exist but are not available on their aircraft.²⁰ Such disparity leaves the impression that they will never employ technologies such as autonomous teaming, multi-aircraft control, artificial logic and decision making, and so forth. It is important to understand the need for tailorable autonomy levels to afford the opportunity to build operational trust in new automated functions cautiously.²¹ All of these features are technically mature but require giant leaps forward in RPA CONOPS and TTPs to bring them into operational use.²² Missing is a bridge between the current set of TTPs, accepted norms, training, and technology and the ever-evolving state of the art.

The New Domain

Unbeknownst to some community leaders, its members have already begun building such a bridge! Through auditing and processing of the Predator and Reaper systems' exploitation support data (real-time aircraft and sensor payload telemetry) and digital terrain elevation data (database of terrain and elevation values used by the system), some astute operators have constructed a series of basic piloting aids—the first steps to trusting autonomy. Initially, these tools were a quick reference for aircraft-sensor look angles as well as flight data such as airspeed, heading, and altitude. Additionally, the tools supplied data such as target coordinates, elevation, and aircraft height above target. Not only was the tool capable of supplying pilots with these data sets for their own aircraft but also they could select other aircraft in the network and pull their data as well. Next, the exploitation support data was used to derive tailored two-dimensional visual representations of relevant elements of the tactical situation, continuously updated based upon aircraft altitude and bank angle. Currently, these tools have been programmed to provide predictive position points

based upon aircraft turning radius and current winds to aid pilots in more precise attack positioning.²³ The tool has been accepted with open arms in the pilot community as a situational awareness asset that will lighten a pilot's cognitive load during complex maneuvers. However, the community at large does not see past using these tools as visual aids and quick references for data. Pilots and operational leadership argue ad nauseam about button positioning and functionality, color coding, and optimal tool positioning for pilot cross-check. They fail to recognize that it would be advantageous to abandon such tedious and time-consuming exercises and instead envision the revolutionary capabilities that expanding upon tools like these could provide in the near term.

An intuitive next step is to visually represent a continuously updating "predictive" flight path arc based upon current winds and commanded bank angle in two dimensions. A further progression would overlay a three-dimensional steering line on the video feed of the pilot's head-up display (HUD) that would indicate turning cues and finite steering paths for optimal positioning. The pilot's current cross-check of *eight* monitors would be virtually eliminated by something as simple as enabling the primary HUD screen to have a selectable overlay source input or utilization of a tool like Google Glass that would permit the selection and display of third-party overlay software of the kind proposed here.²⁴ On the sensor-operator side of the GCS, a similar overlay capability on that station's HUD might include a pointer to another payload's target. For example, having an arrow pointing in the direction of where another aircraft is looking with its sensor and then including a floating box on the sensor's screen that hovers over a vehicle that the other aircraft was following would make the tactical task of passing custody of a target infinitely easier. Additionally, the software can and should allow manipulation by targeting officers. They should be able to drop target coordinates in the system; assign collection goals such as desired look angle, standoff distance, and camera type; and then assign specific aircraft to these targets based upon load-out (of ammunition), unique capabilities, and availability with respect to maintenance status. The system would then visually represent the target and collection parameters and notify the selected aircraft of the new target. This capability is a fundamental shift in the norms of RPA collection from considering what the aircraft and aircrew can provide to what the supported unit wants from a target. It is a perspective change that shifts the focus from crew input to desired customer output.

Everything discussed thus far constitutes a basic exercise of graphical user interface and information networking. If handled by the right contractor, it represents fewer than six months of work to build, test, and implement. The system currently used by the operational community was developed by a single pilot in his spare time on his home computer over several months.²⁵ The giant leap forward in RPA capability and TTPs is closer than most operators realize. For example, one could amend the hypothetical software package's requirements (that have thus far been extremely simple) to include the ability to assign a continuously updating series of Global Positioning System coordinates and waypoints to its predictive flight paths and payload cues. These cues create holding patterns based upon customer-desired collection parameters such as look angle, standoff distance, and SIGINT effects. Starting at the customer's list of prioritized targets (with desired collection-parameter

information), the system builds the optimal orbits and recommended aircraft capabilities and load-outs. It then generates transit missions to and from a home airfield to the target, utilizing knowledge from the air tasking order or along air traffic control preassigned common routes while continually monitoring the fuel needed for the return trip. Lost-link contingency routes (a series of autopilot waypoints that pilots currently set by hand for the aircraft to follow to return to base in the event of the total failure of satellite links) would automatically follow the aircraft from target to target and maintain a safe routing to the recovering base. Its data sources would include weather, restricted operating zones, and air traffic control activity, eliminating the need for the pilot to continuously update the routing. In today's configurations, the only thing separating the system from direct control of the aircraft is the pilot. The missing link is the ability of the third-party software to interface bidirectionally with the present GCS software. If the Air Force were to order a software update that allowed the GCS to accept console commands from a securely authenticated alternate source other than the stick, rudder, and throttle, the aircraft could follow third-party system cues, sidestepping the proprietary portions of the system and unlocking the RPA's true potential.

Thus begins the process of rejection, caution, acceptance, and dependence on new technology. Initially, the system will produce flight paths for pilots to review and either accept or reject. The pilot would choose whether or not to allow the system to generate operational and contingency routing and upload them to the GCS. During the period of caution, features (perhaps best thought of as "apps") could be added to the systems' "playbook"—such as specific collection maneuvers, optimal SIGINT collection orbits, or even time-on-target maneuvering for weapons employment (with respect to aircraft positioning only, not actual weapons release). The level of automated functions should be tailorable—an autonomy "dial" that lets operators choose how much or how little to be involved in the direct control of the system. After a period of time, caution will evolve into acceptance, community norms will direct pilots to use the system, and it would be taught to new pilots as the primary approach to mission management. Eventually, the community would become dependent on the AMPLEX system for most of the dull, tedious mission sets. The days of manually entering waypoints to build erratically behaving navigational routes using original proprietary software would become a distant memory.

The third-party system described is an open-architecture software construct that will not only allow for monumental leaps forward in autonomous functions but also lead to rapid integration of new capabilities. The first and most important capability it can facilitate is the integration of Link 16 (tactical digital information link [TADIL-J]) or other air/ground-to-air data links to the RPA community. The limiting factor, once again, is the ability of the third-party system to take command of the aircraft and sensor payload. Aircraft equipped with Link 16 have the option of slaving their sensor payloads to Link 16 coordinates and autoslew to view or mark a target. The same function is needed on board the RPA lest the almost instantaneous process of machine-to-machine cueing between Link 16 and targeting pods be bogged down by machine-to-human-to-machine interfacing and manual input of target coordinates. Similarly, ground-based customers able to view the video feed via the remotely operated video enhanced receiver (ROVER) could hypothetically take control of the

payload to quickly gain situational awareness of their surroundings as well as personally verify locations of friendly and enemy forces. This CONOPS would replace the current practice of Army, Marine, and special forces customers having to verbally “talk-on” sensor operators to targets.

Interlinking RPAs and enabling target coordinates to flow quickly between air and ground assets, in addition to utilizing open-architecture GCS mission software, will allow the RPA to become much more useful for combatant commanders. The same process of integrating Link 16 on the Predator/Reaper can be used to integrate air-to-air or new air-to-ground weapons. Third-party software can transpose real-time aircraft telemetry data into weapons-employment-zone validation programs and project the zone on the customized HUD, ensuring that pilots can quickly release weapons on cross-cued targets within valid employment parameters. Interlinking also offers a backup to loss of satellite data links. The aircraft could still retain a level of autonomous functionality for full motion video or SIGINT collection, shift transmission to theater nodes, and continue to slave the payloads to cues given by joint partners in-theater.

Embracing Leadership in Innovation

The AMPLEX example may seem ambitious—all of the “what ifs” inherent to implementing autonomy in a weapon system create a general perception among operators that this kind of CONOPS is unachievable. However, the responsibility of creating technological solutions to enable a CONOPS is not the concern of operational squadron, group, and wing leaders. They have a blank check limited only by their imaginations when influencing a new CONOPS and should state the *normative*, optimal way of things rather than agonize over every detail of how other units and agencies in the Air Force and how industry will attain it. With a clearly defined CONOPS, the Air Force can begin writing forward-looking requirements, and industry will answer the call under normal market mechanics. This flow is how large steps in technological progression occur: not by looking at what is currently on the shelf or waiting on a salesman to present a new capability and figuring out a way to stitch it on an airplane, but by conceptualizing to bridge notional applications of technology to enable tactics that will vastly improve and perhaps completely change the way the Air Force does business.

Cost-effective and dramatic improvement in capability through software architecture changes and digital data-linking of RPAs with theater assets are all technologies ready for near-term transition. An open-architecture RPA system can harness the rate of technological progression and reverse the current acquisition practices: technology must not drive requirements—the opposite should be true. The benefits of such a program not only will reap manpower savings through automation of dull mission sets but will do so while concurrently multiplying operational capability. To date, the current emphasis on the “culture of innovation” in the Air Force has manifested as improvements to menial processes. Reorganizing a maintenance shop to reduce an Airman’s travel between stations, claiming hundreds of man-hours saved 30 seconds at a time, or streamlining taxi procedures saving a minute

or two of fuel per T-38 sortie are smart moves but hardly innovative. An AMPLEX program will present a substantial step forward in TTPs and operational capability, not through employing an entirely new aircraft acquisition but through releasing the current sole-source systems to an open-software architecture. Only when Air Force leadership truly enculturates innovation by developing forward-looking CONOPS can the service resume its responsibility to lead industry in the development of RPA technology and break free of the sole-source paradigm. ★

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23. MissionX client was developed by Capt Brandon Magnuson. FocusedX is a derivative of MissionX (later adapted as a plug-in for Raytheon-Solipsys's "Zeus" software, developed by Focused Support LLC).

24. Google Glass is an optical head-mounted display that can project opaque digital data into the user's field of view.

25. The MissionX client was developed entirely in Captain Magnuson's spare time and transferred between his personal and government computers throughout several iterations until his time of departure from Creech AFB, NV.



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Captain Wilson (BS, Auburn University; MAS, Embry-Riddle Aeronautical University) is a dual-qualified MQ-1B and MQ-9A mission control element flight evaluator, MQ-9 launch recovery element pilot, mission commander, and chief of weapons for the 556th Test and Evaluation Squadron, Creech AFB, Nevada. Formerly, he served as branch chief of MQ-1 weapons for the 867th Reconnaissance Squadron, where he logged over 2,000 hours executing diverse mission sets in the Predator and Reaper systems. Before volunteering as one of the first individuals for 18X Undergraduate Remotely Piloted Aircraft Training, Captain Wilson served at Wright-Patterson AFB, Ohio, as the Air Force Research Laboratory (AFRL) / XP unmanned systems portfolio manager, integrating research and development efforts concerning unmanned aircraft systems across the AFRL, Office of the Secretary of Defense, and NATO partners. He also served as the Block 5 Reaper Systems engineer in the MQ-9A system program office, where he led developmental efforts such as auto takeoff and land, sense and avoid, airworthiness certification, and special programs. Captain Wilson offers a rare fusion of insight from acquisition, engineering, test, and operational experiences.

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Intelligence Support for the F-35A Lightning II

Capt Stephanie Anne Fraioli, USAF

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The F-35 Lightning II is the first joint fifth-generation fighter aircraft; therefore, the Air Force, Navy, and Marine Corps need to codify the requirements for intelligence support to fifth-generation airframes. Making informed decisions necessitates an operational understanding of current intelligence gaps, shortfalls, and their impact on the Air Force's ability to execute assigned missions. To obtain this level of understanding, the service's leaders must have a clear picture of the threat. This article seeks to inform readers about the F-35's capabilities and mission-planning considerations, identify deficiencies in intelligence employment and dissemination, and recommend a way forward for unit-level intelligence. The article does not address either the tasking or allocation of the F-35A; neither does it examine processing, exploitation, and dissemination since these subjects deserve their own discussion. Follow-on submissions will detail additional topics.

F-35 Capabilities

Fifth-generation technology was designed to penetrate denied airspace. Specifically, the F-35 Lightning II is advertised as a multirole follow-on to the A-10, AV-8B, F-16, and F/A-18A/B/C/D aircraft. The F-35 is not a chronological replacement to any airframe but a fifth-generation platform that demands increased information. Therefore, one cannot approach the subject of intelligence support to this aircraft with a fourth-generation mind-set.

A shift into the fifth-generation mind-set is imperative for any fifth-generation plan. This technology relies primarily on low observable (LO) signatures, which are optimized by effective mission planning. Fifth-generation aircraft derive LO properties from five major areas: radar cross section, the infrared spectrum, the visual spectrum, acoustic emissions, and radio frequency emissions. Because of these technological advances, these airframes are even more reliant on mission planning for effective employment. A baseline understanding of LO principles is critical to our Airmen's effectiveness. These underlying concepts are generally unclassified and should be incorporated into introductory schooling for intelligence professionals.

With fourth-generation fighter airframes, speed and energy equaled life and survivability. In the fifth-generation realm, information equals life. The evolution of the F-16 to the F-35 can be likened to that of a landline phone to a smart phone,

which can automate every aspect of one's life, constantly maintain situational awareness of social media and electronic mail, and make bank account information constantly accessible. Operators of fifth-generation aircraft do not need to perform antiquated functions because the jet automatically provides them with fused information—what the community calls *sensor fusion*, produced by electromagnetic and infrared spectrum dominance.

In fourth-generation platforms, the pilot has to manipulate labor-intensive avionics with less accurate sensors. By comparison, the F-35 attains spectrum dominance by utilizing sensitive, intricate sensors and then sending information from them to a sophisticated computer that supplies actionable data at a rapid processing rate. The F-35 is an information-hungry aircraft. Because fourth-generation technology places a significantly larger information burden on the pilot, the impetus is on intelligence support to ensure that flyers are prepared. A fifth-generation airframe will alleviate ambiguities with factual confidence ratings. If intelligence support to this airframe is effective, then the F-35 becomes a force multiplier. By default, its presence makes other aircraft more lethal, bridging the gap between fourth- and fifth-generation platforms. The F-35 Lightning II has a number of unprecedented collection capabilities that will require quick analysis and dissemination to guarantee the success of future missions.

Gaps in F-35 Employment and Dissemination

Air Force leaders must understand the direct correlation between fielding a new platform and ensuring sufficient capability to collect, exploit, analyze, and disseminate battlefield intelligence to operational decision makers. Getting the right findings from these airframes to the right customer in a timely and effective manner is critical to combat effectiveness. In the war of information, the speed and accuracy with which one does so determines the victor.

Currently, the analytic cycle is too slow to accommodate the needs of the F-35's capabilities. As information technology advances at an exponential rate, the intelligence community must transform the way data is processed. Activity based intelligence (ABI), the latest trend in advanced analytics, is a methodology that enables identification of patterns, trends, and networks hidden within large amounts of data from multiple sensors. Although ABI and big data are separate concepts, this method of approaching F-35 intelligence analysis lends itself well to big-data problem sets like the considerable amounts of information that the F-35 can produce.

Additionally, unit intelligence support does not have access to the mission-planning software that the F-35 utilizes. Currently, inherent postmission products such as weapon system video cannot be created or disseminated. Air Force initial operational capability is approximately one year away for the F-35, but this gap will continue to be problematic with regard to getting the right intelligence to the right people at the right time. F-35 intelligence support personnel must have access to mission-planning software in order to satisfy this requirement.

Other fifth-generation aircraft can off-load data at a rudimentary level for exploitation and dissemination after the platform has landed; however, leveraging the Air

Force's distributed common ground system architecture for real-time exploitation ensures that the customer receives the intelligence in the swiftest possible manner. Because analyzing all of the information that the F-35 could provide would be impossible, one must utilize the collection-management process and ABI to identify specific intelligence demands.

Three key obstacles have prevented exploitation nodes from using information derived from fifth-generation sources. First, the data is compatible with a system not installed at most exploitation locations. Outfitting nodes with the common operating system presently employed by F-35 units will enable analysts to view, exploit, and produce intelligence in a timely manner.

Second, there is still severe separation outside the fifth-generation community concerning program access. For example, it is difficult for the F-22 and F-35 communities to plan missions at the program level in the same physical environment. To optimize these airframes, they must be able to plan and live in the same space. A fifth-generation combat ecosystem must exist within which all airframes and support systems can successfully communicate. This ecosystem should consist of common special access program clearances for all participants, common mission-planning spaces, and systems for all fifth-generation platforms.

Third, we have no fielded capability to disseminate near-real-time video and/or images through a line-of-sight architecture in order to effectively enable close air support missions. The absence of this ability decreases the level of verification between the joint terminal attack controller and pilot. Incorporating a remote operational video enhanced receiver (ROVER) capability would allow visual correlation between what the pilot sees at altitude and what the controller sees from the ground.

Unit-Level Intelligence Support

Fifth-generation unit-level intelligence is critical at several junctures in the mission-planning process. First, the unit offers intelligence preparation of the operational environment / predictive battlespace awareness assessments to leadership and mission planners. This step sets the foundation for how the mission-planning cell will leverage LO characteristics to deny the enemy's integrated air defense system (IADS) the ability to engage, and it identifies threats relevant to the tasked mission. Second, unit-level intelligence offers the most up-to-date order of battle to mission planners. Analysis of the threat country's IADS in the predictive battlespace awareness—combined with the air order of battle, naval order of battle, ground order of battle, electronic order of battle, and defensive missile order of battle—permits the mission planners to reduce the order of battle to a strict examination of the factor threats and thus optimize a fifth-generation route.

Based on the mission-planning considerations under discussion, unit-level intelligence plays a significant role in assuring the survivability of both the fifth-generation pilot and mission success. Primarily, unit-level intelligence supplies a detailed enemy threat analysis that produces recommendations on weaponeering, rules of engagement, special instructions, route analysis, and overall airframe integration. The unit compares a country's systems within the three functions of its IADS (air

surveillance, battle management, and weapons control) against the airframe's ability to discern any weaknesses for exploitation.

Lastly, the intelligence community is always focused on 1N0 (intelligence applications) support to fifth-generation issues but frequently overlooks the following enlisted Air Force specialty codes: 1N1A (geospatial intelligence analysis), 1N1B (targeting), and 1N2A (signals analysis). Arguably, imagery and signals intelligence are equally or more important than 1N0 support. Specific information coming off these airframes must be analyzable and digestible as quickly as possible. All of these disciplines will prove instrumental in F-35 exploitation; therefore, fifth-generation basics should be incorporated into formal training at a primary level for these specialty codes.

Conclusion

Examining fifth-generation capabilities and associated gaps in different operational environments will help planners better understand their ramifications, develop viable mitigation strategies, and adapt new capabilities to reduce the effect of such deficiencies. It is important for all services to realize that the platform, though designed to counter advanced threats, can also be employed in a reconnaissance role. The future of intelligence support to fifth-generation airframes will be a hybrid of traditional unit support; intelligence, surveillance, and reconnaissance; and targeting support now tailored to LO platforms. Additionally, security considerations with regard to information digestible by the distributed ground station and within the fifth-generation community can be cumbersome to navigate in today's multinational environment. Despite these limitations, fifth-generation aircraft bring a significant capability to the table. The intelligence community cannot wait until hostilities commence to address these gaps. To effectively accommodate the joint fifth-generation community, the Air Force should not overlook an increased level of intelligence support; instead, the service must demand it 🌟



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An Inoffensive Rearmament: The Making of the Postwar Japanese Army by Col Frank Kowalski, edited and annotated by Robert D. Eldridge. Naval Institute Press (<http://www.usni.org/naulinstitutepress>), 291 Wood Road, Annapolis, Maryland 21402, 2014, 214 pages, \$37.95 (hardcover), ISBN 978-1-59114-226-3.

To Col Frank Kowalski, chief of staff for the Civil Affairs Section Annex (CASA) of the American occupation headquarters, Emperor Hirohito's address on 3 May 1952 announcing the return of Japanese sovereignty meant "a new day and a new era had dawned in democratic Japan" (p. 170). However, the path to this new political reality was deeply intertwined with the transforming geopolitical situation in East Asia and formation of the Japanese National Police Reserve (NPR), precursor to the Japanese Self Defense Force. The NPR, which CASA organized, equipped, and trained, was an army formed covertly against the very legal precedent of postwar "disarmament" set by Gen Douglas MacArthur, Supreme Commander for the Allied Powers. Convinced to never let Japanese militarism threaten the security of the Asia-Pacific again, MacArthur had carried out one of the most intensive disarmament programs in history following World War II.

After 1945 the American occupation forces purged Japanese society of militarists, disbanded the armed forces, and dismantled the nation's industrial capacity for war. Furthermore, the American-crafted Japanese Constitution of 1947 strictly forbade the rearmament of Japan in perpetuity. Article 9 dictated the renunciation of war as a "sovereign right of the nation," the removal of the state's "right of belligerency," and the maintenance of "war potential" (p. 33). To Japanese, American, and international observers of the period, Japan likely would never have a standing military force. However, the rapidly deteriorating geopolitical situation in East Asia in the early Cold War provided the strategic pretext to circumvent the constitution in a manner that trounced what Kowalski termed the "noble aspirations" of Japan (p. 44).

The invasion of South Korea by Soviet-backed North Korea in June 1950 changed the entire calculus of US security in the region. The rapid collapse of the South Korean army required immediate reinforcement from the American occupation forces in Japan. By the end of 1950, all US combat divisions had vacated Japan for the Korean Peninsula. Japan, US logistical nodes, and hundreds of thousands of American dependents were now threatened by the ensuing "gaping power vacuum" (p. 174).

The possibility of communist insurrection and Soviet invasion led Prime Minister Shigeru Yoshida to declare the situation a gift by the "Grace of Heaven" (p. 1). In this new security environment, America needed Japan to become a strong ally capable of defending itself and US interests in the country; Japan needed a military. In fact, MacArthur ordered the rearmament of Japan in response to the Korean War. Consisting of four infantry divisions with a combined total of 75,000 troops, the NPR was founded on 10 August 1950 without any reliance on former Imperial Japanese Army (IJA) officers, doctrine, or equipment. However, although Kowalski supplies organizational descriptions, the work is less about the NPR order of battle and more about the underlying political power struggles surrounding its creation.

Kowalski terms the formation of the NPR "a masterpiece of evasion and chicanery" by both the Japanese and Americans (p. 31). Working within the legal confines of its pacifist constitution and MacArthur's previous "demilitarization" policies, CASA rearmed Japan behind a smoke screen of political misinformation, denial, and deception. Misleading nomenclature became a major component of the effort as "reservist" (*yobitai*) replaced "soldier"

(*heitai*) and tanks became “special vehicles” (p. 121). The supply of American weapons and equipment countered the charge of redeveloping Japanese industrial capacity for war while the conservative Japanese government continually denied any allegations of rearmament within the Diet. Though the NPR would eventually incorporate vetted IJA officers and support a subdued form of the IJA’s “warrior religion” (*Seishin Kyōiku*), the NPR remained an American army in organization, tactics, discipline, and equipment (p. 109).

Colonel Kowalski’s account should be understood within the political context of the period. Originally published in Japanese in 1969 at the height of the Vietnam War, the work benefited from nearly two decades of hindsight. Kowalski’s description of the threat of communist subversion in Japan, though real enough at the time, was certainly influenced—and likely exaggerated—by the lengthy intervening period of anticommunist fervor in the West and the author’s own service on the Subversive Activities Control Board (1963–66). Furthermore, Kowalski deplores the United States’ “playing God” with the Japanese by undermining their constitution in order to build the NPR, but he fervently carried out his duties as a key American enabler of the rearmament program (p. 44). Perhaps this running contradiction, which occurs throughout the work, was an effort by Kowalski to appeal to both “pro” and “anti” armament advocates within his anticipated Japanese audience. Moreover, his assumption that the Japanese people demonstrated a “deep appreciation for their conquerors” seems quite paternalistic. Certainly, MacArthur’s martial emasculation of the militarists and the suppression of communist aligned interests created resentment in sizable portions of the population (p. 7).

Ultimately, *An Inoffensive Rearmament* offers a unique perspective of early American efforts at building partner capacity in Asia. Such efforts continue to form the core of American military engagement in the region in the form of the Asia-Pacific “pivot.” Moreover, North Korea, China, and a resurgent Russia remain the chief antagonists of the US-Japan alliance. Today the conservative Liberal Democratic Party of Prime Minister Shinzō Abe, inheritor of Prime Minister Yoshida’s “pro” rearmament faction, continues to incrementally expand the capacity of the Japanese Self Defense Force in the face of traditional socialist opposition. The Liberal Democratic Party, still confined by Article 9, continues the gradual expansion of Japanese military potential as demonstrated by the lifting of the postwar ban on arms exports in April 2014 and the announcement of new guidelines in April 2015 allowing Japanese forces to defend American forces. Although the US-Japan alliance will endure as the primary pillar of Japanese defense policy for the foreseeable future, progressive rearmament in response to an increasingly assertive China and the perceived withdrawal of American influence is highly probable. Colonel Kowalski’s work offers an excellent historical narrative of the politics of remilitarization, well suited for American officials engaged in similar partnership-building efforts in the twenty-first-century Asia-Pacific and beyond.

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Endurance and War: The National Sources of Military Cohesion by Jasen J. Castillo.

Stanford University Press (<http://www.sup.org/>), 425 Broadway St., Redwood City, California 94063-3126, 2014, 328 pages, \$55.00 (hardcover), ISBN 9780804789103.

Scholars and practitioners alike have long attempted to capture the elements that make a fighting force unconquerable regardless of the objective situation. Why do some forces fight on, using every tool in the box and some improvised on the spot, while others collapse at the first hint of adversity? The answer is important if not vital to battlefield success in an

unstable world. *Endurance and War* is among the latest political science / security studies monographs to attempt to answer the question.

Jasen J. Castillo is an assistant professor in the Bush School of Government and Public Service at Texas A&M University. Rejecting earlier theories, he proposes a new theory to explain why some armies perform better than others. According to Castillo, what he calls cohesion theory better accounts for success than do the currently popular explanations. He selects various episodes in a variety of conflicts with reasonably wide geographic representation to illustrate why some armies persist while others fold their tents and steal quietly away.

According to cohesion theory, two elements determine armies' staying power—the regime's control over the army and the degree of autonomy the forces have in training. Regime control promotes loyalty in civilian and military sectors, and inevitably a hard core of true believers will serve in the military as exemplars or enforcers. Force autonomy allows the military to develop its own norms, methods, and tools.

Within the context of the two elements—regime control and force autonomy—are four types of military, each having a different degree of cohesion. The types are messianic, authoritarian, professional, and apathetic. Messianic armies are zealots, a prime example being the Vietnamese nationalists. Authoritarian forces are represented by the Soviet Union. Americans are professional, and the French in World War II were apathetic after being professional in World War I. Germans went from professional to messianic from one world war to the next.

Castillo argues against straw men, including small-unit bonding, democracy, nationalism, and defense of home territory, all among the current theories of force cohesion and stamina. As he provides example after example of cohesion or lack of it, he reiterates how one or all of these theories falls short in comparison with his cohesion theory. The author finds the best armies to be messianic with strong support from and belief in the regime and a great deal of latitude in developing themselves as autonomous fighting forces. Messianic armies are determined, creative, and capable of fighting regardless of loss of leadership or changing circumstances.

Case studies include Germany in the final months of World War II, France in the early stages of that war, the Soviet Union after the German invasion, North Vietnam from 1965 to 1973, and the United States from 1968 to 1972. Where appropriate, Castillo looks backward to explain the character of each force—for instance, tracking French history back to the determined stands of World War I and the postwar disarray and disillusionment that led to a superiorly armed force with inferior and distrusted leadership and poor enlisted motivation. The demoralized force was slow to react, halfhearted when it did, and easily routed by an inferior force with superior leadership, motivation, and flexibility, leading to a crushing defeat in 1940. Furthermore, a professional force in Vietnam fell despite its competence as belief in the cause faded over time. Simultaneously, a messianic force unable to win much of anything prevailed because of its absolute belief in its cause and its ability to adjust to any circumstance.

In summation Castillo discusses the implications of cohesion theory for the contemporary way of war, the asymmetrical and nebulous battlefield, and messianic forces that confront American professional forces. According to his theory, Americans should lose heart or interest well before the war ends. Professionals fade against messianic forces, he contends. Although the author offers several instances of transformation of an army from one type to another, for good or ill, he does not give a prescription for creating one from another.

Structurally the book is solid. Castillo includes an abundance of maps and tables as well as the customary scholarly trappings—notes, bibliography, and index. Because he eschews jargon, thus maintaining readability for the interested nonacademic professional warrior, he has little need for a glossary and does not provide one.

As with all new theories building on a sample rather than a full range of instances (something that time and length preclude), cohesion theory is vulnerable to criticism from those who claim that the author has cherry-picked his examples or that he has oversimplified them. But this work is an introduction to a new theory, not a synthesis of previous research, and Castillo does lay out flaws of the earlier interpretations systematically, case by case, and almost mechanically as he works his way from one army to the next in his small collection.

A greater concern than the validity and completeness of the sample is that Castillo offers no insights into how one of the deficient armies can overcome its shortcomings against a more determined force. No mechanism exists for changing an army even though some armies in his sample change over time, switching from one type to another due to politics, social conditions, and other factors. He is short on means to instill the messianic impulse, by implication a desirable development if American and Western forces are to stay the course in the long and perpetually inconclusive war against a collection of enemies even less structured than the North Vietnamese. Because the future will probably confront the American professional force with a variety of messianic foes, someone should take Castillo's thesis to the next level down, from theory to technique for overcoming a built-in weakness of professionalism and weakening instead the die-hard foe. Probably the author would have a stronger case had he been able to more directly address the factors that, for instance, changed the French and German armies from one war to the next. Perhaps that sort of exploration would offer at least a hint of guidance for American forces increasingly facing inferior opponents with superior determination and willingness to stay the course regardless of the time or cost.

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Harnessing the Sky: Frederick "Trap" Trapnell, the U.S. Navy's Aviation Pioneer, 1923–1952 by Frederick M. Trapnell Jr. and Dana Trapnell Tibbitts. Naval Institute Press (<http://www.usni.org/naivalinstitute/press>), 291 Wood Road, Annapolis, Maryland 21402, 2015, 288 pages, \$29.95 (hardcover), ISBN 9781612518480.

In the vast literature of World War II airpower heroes, is it possible to have missed a vital aviation innovator? The biography of Frederick "Trap" Trapnell questions the notion that innovation relies on the inspirations of elite scientists and exploits of new technologies. Set in the pre- and post-World War II era, this biography illuminates the infancy of America's test pilot program. Notably, it is written by Trap's son Frederick Jr. and granddaughter Dana Trapnell Tibbitts. Although the authors' kinship clearly establishes credibility, the biography spends relatively little time on Trap's difficult home life, instead casting him in a predictably heroic light. Nonetheless, the familial bias does not diminish the captivating story of arguably the first engineer test pilot, who emerged during a time when that job at home was as dangerous as the war overseas.

Trap's ability to change tactics, procedures, and mind-sets during his lifetime is still a quality often taken for granted in today's Navy and Air Force. To name a few of his accomplishments, he was a superior pilot, commanded an aircraft carrier, invented the antispin parachute, and survived two bailouts and a crash landing. However, in arguably his innovation of greatest impact, Trap developed the balanced design philosophy. While others chose to sacrifice safety in the pursuit of performance, Trap's procedures mitigated often-unforeseen dangers, resulting in superior aircraft for the Navy. Deviating from precedent, he built engineering teams that not only isolated aircraft design flaws and vulnerabilities but also pro-

posed concrete fixes. This scientific approach to improving the force birthed the engineer test pilot and revolutionized naval flight-testing. In a time when Hitler's Germany was rolling through Europe and when Japanese technology was on par with America's, Trap's innovations, which extended into every facet of aviation, were critical to wartime success.

Trap's innovations succeeded because of his emphasis on changing practices instead of acquiring new technology. However, he was not the only innovator of the time: Airmen such as Billy Mitchell also made procedural advancements—albeit through more blustery processes. In contrast to Mitchell and other pilots who gained fame from speed records, daring raids, and even public trials, Trap remained the quiet professional. Highlighting this humility—and in contrast to Jimmy Doolittle's 574-page autobiography—the authors showcase Trap's use of only two paragraphs to summarize his career. Even so, his quiet efforts were pivotal in designing and testing aircraft in the twentieth century through his methodology of integrating flight-test pilots with aircraft developers.

A comparison of Trap to other naval innovators, such as William Moffett, reveals that he had considerably less involvement with the political battles that surrounded naval aircraft. However, in an action that restored naval aviation's credibility, Trapnell was one of the first to recognize US aircraft's limitations against their World War II German and Japanese opponents. To resolve this dilemma, he personally redesigned the Navy's test aircraft—the F4F Corsair—ensuring it could outfly the Japanese Zero. Importantly, Trap found a key balance, showcasing procedural innovation without neglecting technology. His focus on changing mind-sets and procedures combined naturally with technological advancements to create one of the most successful naval aircraft of World War II.

For the astute listener, Trap's call for advancements in tactics, procedures, and mind-sets can still be heard. His lessons were drawn at a time when, much like today, senior leaders requested that aviators turn their efforts toward airpower advancement. Benchmarking a humble approach to innovation—often lacking in today's technology-dependent forces—Trap demonstrated that the definition of improvement does not need to be inextricably linked with high-end contracts. Instead, his message is that innovation has to do with improving cultural standards and war-fighting processes; technology is simply one means of arriving there.

Harnessing the Sky is a valuable read for contractors and flight-test engineers. However, it is also applicable for aviators who are challenged to innovate in a technology-dependent force. For any audience, Vice Admiral Trapnell is worthy to stand among both the pioneers of military aviation and today's flight-test programs. His legacy prompts military operators to question the conventional thinking that ties innovation solely to costly new technology. It is of key importance that aviators—like Trap—find the procedures within their purview that they can refine to meet current threats. The principal message of Fredrick Trapnell's example, given a clear voice in this inspiring biography, is that all United States flyers need to be innovators.

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Ways of War: American Military History from the Colonial Era to the Twenty-First Century by Matthew S. Muehlbauer and David J. Ulbrich. Routledge (Taylor & Francis Group) (<https://www.routledge.com/>), 711 Third Avenue, New York, New York 10017, 2014, 537 pages, \$72.95 (softcover), ISBN 9780415886772.

Matthew Muehlbauer and David Ulbrich's *Ways of War* is an ambitious undertaking, attempting to include in a single volume the entirety of the American wartime experience. The authors further seek to analyze and distill tactical, operational, and strategic highlights

from over 400 years of conflict. Despite this noble, well-intentioned goal, the result is a shallow analysis that loses itself among the ranks of undergraduate surveys of niche American history.

Early in the work, Muehlbauer and Ulbrich recognize the vast span of their undertaking and try to find middle ground in the quagmire of sociopolitical relations inherent to the study of conflict and a purely tactical analysis of various engagements throughout history. They attempt to overcome the limitations of a manageable page count by supplementing the text with a website. The online information does an admirable job of adding to the printed material and allows the inclusion of updated analyses of modern conflicts. Regardless of the constraints of transforming such a vast topic into a manageable tome, Muehlbauer and Ulbrich do bring to light the evolution of the American “way of war” throughout our nation’s comparatively brief history, from the unique evolution of militia-based defense forces that became the basis for our current National Guard and Reserve to the “chicken and egg” interaction between technological advances and associated tactical and operational evolutions.

One final shortcoming of the work is the lack of fundamental historiography. Intending the work for the novice historian, the authors had an opportunity to display a good, fundamental application of professional historical writings. However, the lack of references to primary sources and the use of vaguely associated endnotes in each chapter set a poor example of attributing source material, building a historical narrative, and supporting an overarching thesis.

In totality, *Ways of War* tries to reach too far. Although it falls short of its premise, it effectively assembles a single narrative of the evolution of American warfare. Further, the book manages to do so without being overly trite or cliché. It provides a framework of knowledge that an inspired undergraduate could build on in pursuit of a higher understanding of a very complex and challenging topic.

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Nixon’s Nuclear Specter: The Secret Alert of 1969, Madman Diplomacy, and the Vietnam War by William Burr and Jeffrey P. Kimball. University Press of Kansas (<https://kuecprd.ku.edu/~upress/cgi-bin/>), 2502 Westbrooke Circle, Lawrence, Kansas 66045-4444, 2015, 472 pages, \$39.95 (hardcover), ISBN 978-0-7006-2082-1.

William Burr and Jeffrey Kimball’s *Nixon’s Nuclear Specter* is a deep dive into events that led up to and surrounded a series of military operations and exercises officially known as the Joint Chiefs of Staff Readiness, referred to by the authors as the “Secret Alert of 1969.” Utilizing recently declassified documents, they open a window on the policy, strategy, and planning that occurred in the spring and summer of 1969 which culminated in a failed attempt of coercion by threatening nuclear use in October of that year.

“The most extreme threats—nuclear threats—are unlikely to succeed when the side threatened possesses its own nuclear weapons” (p. 333). This conclusion, stated in the epilogue, has profound consequences for the utility of nuclear weapons. Given their high cost and massive destructive potential, it is worthwhile to consider the past, present, and future utility of these devices. No war between superpowers has occurred for over 70 years, and considerable historical analysis suggests that this status is due in no small part to the United States’ credible deterrence. While reinforcing the value of nuclear weapons as a deterrent, this book explores the risks and limits of using nuclear threats as an instrument of coercive foreign policy. Specifically, it considers the Nixon administration’s development of nuclear options to coerce nonnuclear Vietnam and the Soviet Union.

Five US presidents had to deal with the protracted and ultimately unsuccessful Vietnam War. US involvement began in 1955 under the Eisenhower administration with the deployment of the Military Assistance Advisory Group to support South Vietnam forces. Following the Gulf of Tonkin incident, combat operations intensified during the Johnson administration and peaked in 1968 with 536,000 US troops deployed in support of the conflict. When Nixon took office in January 1969, 300 service members were dying each week, antiwar protests had reached a fever pitch, and the US public wanted an exit strategy. Within this context, Nixon and Kissinger considered options that would force a rapid resolution to the conflict.

By the summer of 1969, despite aggressive military action in South Vietnam, Laos, and Cambodia, it became clear that the Government of North Vietnam was not interested in a peace that included a permanent partition of the country. Believing that North Vietnam and the Soviet Union would not risk escalation, the US military began developing options which would signal that Nixon, backed into a political corner, might irrationally escalate to total war. What followed was a deliberate plan to operationalize the “Madman Theory” by threatening the use of excessive force, including the mining of North Vietnamese ports, tactical nuclear interdiction, and a secret global alert of strategic nuclear forces.

Ultimately, the threat of excessive escalation (via the Secret Alert of 1969) was a poorly executed bluff. In retrospect, shortcomings were numerous: Nixon did not authorize any strikes in North Vietnam; attacks were restricted to North Vietnam facilities in Cambodia and Laos; the alert was not accompanied by a change in defense condition (DEFCON) military status; and Nixon had begun the rapid withdrawal of forces in July 1969.

These operations sought to send North Vietnam and its Soviet sponsors a message that Nixon was willing to escalate the conflict and use nuclear weapons to secure victory. The ambitious plans included conventional and nuclear interdiction options against North Vietnamese targets, but the approved and executed alternatives were just a series of shows of force. The heightened posture of US strategic forces and nuclear armed bombers flying in the international airspace surrounding the Soviet Union caught the attention of the Soviets, but the scenario was only interesting—not compelling. Given the conduct of the war thus far, these actions did little to change Hanoi’s cost-benefit analysis of continuing the conflict.

The hope that the Soviet Union might attempt to compel a negotiated solution was plausible, but the belief that the North Vietnamese would easily capitulate was fraught with questionable assumptions. Despite Nixon and Kissinger’s aggressive diplomatic wrangling and bellicose rhetoric, the US public was asking for peace, and US military operations were observably winding down. Words and deeds did not match.

Throughout the book, Burr and Kimball repeatedly cast aspersions on Nixon and Kissinger’s strategy of coercion that are far from conclusive. In addition to questioning the strategy of 1969, they also suggest that Operations Pocket Money and Linebacker had little to do with compelling North Vietnam to the negotiating table in January 1973. This conclusion is debatable and not resolved by the authors’ evidence. For Kissinger, the deficiencies of 1969 were a failure of execution—not of strategy. In response to the 1973 Arab-Israeli War, Kissinger (now secretary of state) argued for a rapid and overwhelming response to Soviet threats (p. 331). The ensuing show of force included a nuclear alert that included issuing DEFCON III for all US forces and alerting the 82nd Airborne Division. The authors contend that this action was unnecessarily risky because Soviet general secretary Brezhnev never actually intended to send troops to Egypt. Kissinger’s experience in 1969 had convinced him that caution and indecision were equally risky, and the 1973 Arab-Israeli War ended with terms favorable to the United States and Israel.

Thoroughly researched, *Nixon’s Nuclear Specter* is an interesting, though slightly revisionist, account of Nixon and Kissinger’s handling of the war in Vietnam. Watching Nixon’s ego, indecision, and management style undermine Kissinger’s brilliance and a nation’s reputation

is a painful but instructive lesson on the importance of integrity. Too many competing values drowned out Nixon's "better angels." Instead of guiding principles that flowed from one grand strategy, Nixon allowed multiple strategies to emerge, compete, and interfere. Unfortunately, this book does not greatly expand readers' understanding of the utility of nuclear weapons in warfare. The evidence against coercive military action is inconclusive and leaves us wondering if the strategies discussed might have been effective if properly executed.

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Exploding Fuel Tanks: Saga of Technology That Changed the Course of the Pacific Air War by Richard L. Dunn. Richard L. Dunn (<http://explodingfuel tanks.com/>), 2011, 190 pages, \$29.95 (softcover), ISBN 978-1-4507-7305-8.

Richard Dunn's *Exploding Fuel Tanks* is a must-read for anyone with even a passing interest in how aircraft development shaped the modern world. From a historical and technical perspective, it offers a fascinating glimpse into World War II aviation and the background of its evolution. Rather than writing an opinion piece derived from broad generalizations, the author simply lays out the facts and lets the reader reach a conclusion based on actual evidence.

Historians who focus only on technical specifications oftentimes merely summarize the subject of aircraft development. Instead, Dunn examines the topic at a particular time. For instance, instead of simply addressing the overall history of development, he details how certain decisions were made. Regarding aircraft fuel tanks and armor, the author relates the history of why aircraft progressed as they did.

By digging deeper and asking why, rather than relying on general assumptions, Dunn paints a much better picture of his topic. Take, for example, the widespread perception of the Japanese Zero as an agile yet frail fighter as compared to American aircraft such as the P-40, which was more robust but less agile. Dunn presents the full story, backed up by incredibly detailed research, by exploring records of actual documented combat to determine whether such a perception has a basis in fact. Indeed, the reliance on documented evidence is one of the book's strengths.

On the other hand, one might justifiably criticize the scope of this study. Although I applaud its detailed analysis of the Pacific theater, I would be interested in seeing comparisons between all of the major powers on this subject. Overall, *Exploding Fuel Tanks* is recommended for any aviation enthusiast interested in the history of the development of combat aircraft.

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Clean Bombs and Dirty Wars: Air Power in Kosovo and Libya by Robert H. Gregory Jr. Potomac Books (University of Nebraska Press) (<http://potomacbooksinc.com/>), 1111 Lincoln Mall, Lincoln, Nebraska 68588-0630, 2015, 326 pages, \$26.50 (softcover), ISBN 978-1-61234-731-8.

Robert Gregory's *Clean Bombs and Dirty Wars* is based on the author's argument that "without having anyone on the ground . . . bombs merely agitated the enemy, stiffening their resolve" (p. 3). To support this simple assertion, Gregory, a career Army Soldier and scholar, analyzes the application of airpower in two military operations. In addition, he adds

a bonus subplot with an Army attempt to mimic the “clean” killing of the enemy—an option that precision weapons, via airpower, provide politicians. Considering that the author addresses his ground officer upbringing in writing about airpower, he makes a solid case for using military operations in a joint campaign to attain political goals. Furthermore, Gregory touches upon defense ideologies, political tendencies, and social differences that were present, or created, during both military actions.

First, the author reviews Operation Allied Force, which one might describe as a world moral crisis corrected by the North Atlantic Treaty Organization’s (NATO) diverse military components. This “live” war followed a unique script that played out on the evening news. Politically, this action would not involve a ground campaign because polling numbers suggested that the public would not support it if Soldiers were going to die. To this end, no ground component commander was involved in the campaign.

Gen Merrill McPeak captures the yeoman’s work carried out by Allied Force pilots: “Imagine flying over the Blue Ridge Mountains at 600 miles an hour . . . in overcast [conditions] . . . and picking out the right target down there somewhere in the woods” (p. 47). Eventually, a bomb would be placed on a target, and everyone would be happy. Yet, the shelling still continued because the target was a ruse (i.e., the age-old trick of using black telephone poles made to look like artillery). Somehow, locating the artillery and mortars had to happen, and that would come via an add-on ground commander.

At this point, Gregory identifies counterbattery devices as the linchpin needed to make the airpower campaign successful: these “low-tech microphones and high-tech radars” (p. 48) gave the triangulations of active mortar and artillery for return fire. Now, a 96-pound artillery shell may not come close to causing the damage inflicted by a 2,000-pound bomb, but when combined with accurate targeting from the incoming fire radars, it doesn’t have to. Indeed, the lack of accurate targeting makes that 2,000-pound high-explosive weapon underutilized. When Task Force Hawk arrived in Macedonia with Apache attack helicopters and American counterbattery radars, someone got the idea that the targeting radars could locate the mortar tubes and artillery locations more accurately than the pilots’ eyeballs or the operators of remotely piloted vehicles. This scenario supports the argument that the air campaign first became effective when those same counterbattery radars were linked to the flying artillery of A-10s and F/A-18s circling overhead.

Gregory then goes through a relatively short review of the Libyan conflict. During the uprising against, and then overthrow of, Mu’ammar Gadhafi, the rebels used Internet tools and a crowd-sourced weapons operation and targeting method. Open-source software proved effective, especially when a global following formed to support the rebels’ cause virtually on social media. Consequently, the military key of uplinks to airpower and precision weapons were replaced with “teenagers wielding smartphones. . . . Finding the enemy’s location . . . and air-ground integration remained as elements of continuity in successful joint operations” (p. 216). Enemies also have access to this level of map detail, nearly unlimited information, and intelligence data on troop strengths and military intentions. Initially, NATO had trouble discerning between pro-Gadhafi and rebel forces, but leaflets, telephones, and, finally, Twitter and Google Earth assumed the roles filled by counterbattery radars more than a dozen years earlier.

On the political side, Gregory skirts the topic, but there are suggestions about what he may be alluding to in terms of shaping events by previous actions. These hints stem from how a First Lady, an assistant secretary of state, and a journalist during Operation Allied Force became experts in military power over the secretary of defense during Operation New Dawn, extolling the virtues of airpower-only operations. Note the contrast with Operations Enduring Freedom and Iraqi Freedom, reflected in a statement by President George W. Bush: “When I take action, I’m not going to fire a \$2 million missile at a \$10 empty tent and

hit a camel in the butt. It's going to be decisive" (p. 122). The author makes a very strong case that precision weapons, airpower with no boots on the ground, and a video game approach to military operations are the standard for the future since they pose the least political risk.

Clean Bombs and Dirty Wars should appeal to anyone interested in detailed case studies and in-depth research projects extolling the pros and cons of strategy and politics. But I believe the group that can benefit the most from this work includes White House fellows, congressional aides, political staffers, and anyone involved with politics and the use of the military. The book's principal message is that when politicians use technology to overcome the reality of war's pain and suffering, the effectiveness of the weapons wielded is drastically reduced. Robert Gregory does a fair job of supporting and defending his thesis that friendly ground forces are needed to direct the application of airpower—a tenet that has been around since World War I.

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Remembering America: How We Have Told Our Past by Lawrence R. Samuel. University of Nebraska Press (<http://www.nebraskapress.unl.edu>), 1111 Lincoln Mall, Suite 400, Lincoln, Nebraska 68588-0630, 2015, 204 pages, \$29.95 (hardcover), ISBN 978-0-8032-5433-6.

Military professionals—those who read *Air and Space Power Journal* and other service-equivalent publications—are voracious consumers of history for both personal and professional reasons. We seek not only the lessons of our predecessors as we grapple with contemporary challenges, but also a clearer vision of ourselves as Americans and members of the armed forces. For this reason, a history of American history may interest readers of this journal.

Remembering America begins at the end of World War I. American history up to that point, according to the author, was universally positive, creating the concept of American exceptionalism—a concept that many historians then or now accept as accurate. The rise of progressivism in America brought with it a new crop of historians willing to look at American history more inclusively. Author Lawrence Samuel credits them with presenting the broader perspective of oppressed minorities and the enemy point of view from our various wars, resulting in a more accurate analysis of the American experience. Thus began a pattern in which American history shifted from a uniform construct to a malleable story subject to the vagaries of our contemporary condition and the biases of historians. What should have expanded American history through inclusion actually invalidated previous versions through a process that dismantled our national identity. With the inclusion of each new group—ethnic, racial, sexual, economic, or otherwise—the traditional stories of America are continually watered down and pushed into the background to the point that many individuals now scoff at American exceptionalism, much to the detriment of our sense of Americanism. The biases of twentieth-century progressive historians were just as prevalent as those in any other era. What they left us is an American history, as Samuel sees it, devoid of any absolute truths, drawn not from facts but from contemporary interpretation based on contemporary mores.

History is a continuous argument in the search for the American story and our national identity. The quest for meaning included struggles over presentation. Many, if not most, Americans claim to dislike history. We fret over low student test scores and a general lack of knowledge among the populace. We approach each new announcement as if it is a recent development, but the truth is that Americans' poor historical knowledge is nothing new. Every test or survey taken since at least the 1940s has yielded similar results. Some suggest that history should be folded into the teaching of other subjects, such as social studies—a

recommendation that has caused some people to question not only how we teach history but also whether we even need to offer it as a stand-alone subject.

The entire discussion brings into question whether Americans' supposed dislike of history is accurate. Robust sales of history books and historical novels, as well as the appeal of history-based movies, television shows, and video games, seem to contradict that belief. Their popularity counters the claim that Americans do not like history, further indicating that the problem concerns something other than a lack of interest. The challenge lies in how to present history as relevant and meaningful to what is happening today. Historians have never been able to accomplish that goal on a broad and sustaining scale. The reasons run the gamut of economics and politics that put the teaching of history under a perpetually dark cloud.

The author claims that *Remembering America* is a cultural history of American history that fills a void where none previously existed. Producing cultural histories is this author's genre of choice. He previously wrote a cultural history of psychoanalysis and one of the American dream. Calling this book a cultural history may afford it some level of credibility by making it seem special in some way, but that is overblown. This book is too short to be more than an adequate, but brief, introduction. It skims the surface of the waves of history without diving deeply into any one aspect. Covering approximately 8 decades in fewer than 200 pages of text is hardly exhaustive. What we have here is an extended historiographic essay, a survey of the process of capturing and presenting American history. Additionally, readers may detect a certain political leaning that may be the result of brevity, or it may reflect the author's worldview. Readers can decide for themselves.

After reading this book, one may be left with a decidedly pessimistic view of the future of American history. Society's lack of historical intelligence is reflective of current national challenges. Historians have failed to provide an image of America on which to build a foundation. Rather than offering an accurate rendition of our national story, historians, like the pseudojournalists of today, blather on with politically motivated fairy tales and horror stories that do not educate as much as indoctrinate. Regardless of one's leanings, *Remembering America* is recommended, not because it is great history but because it might spur readers of *Air and Space Power Journal* to begin looking at history more critically.

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