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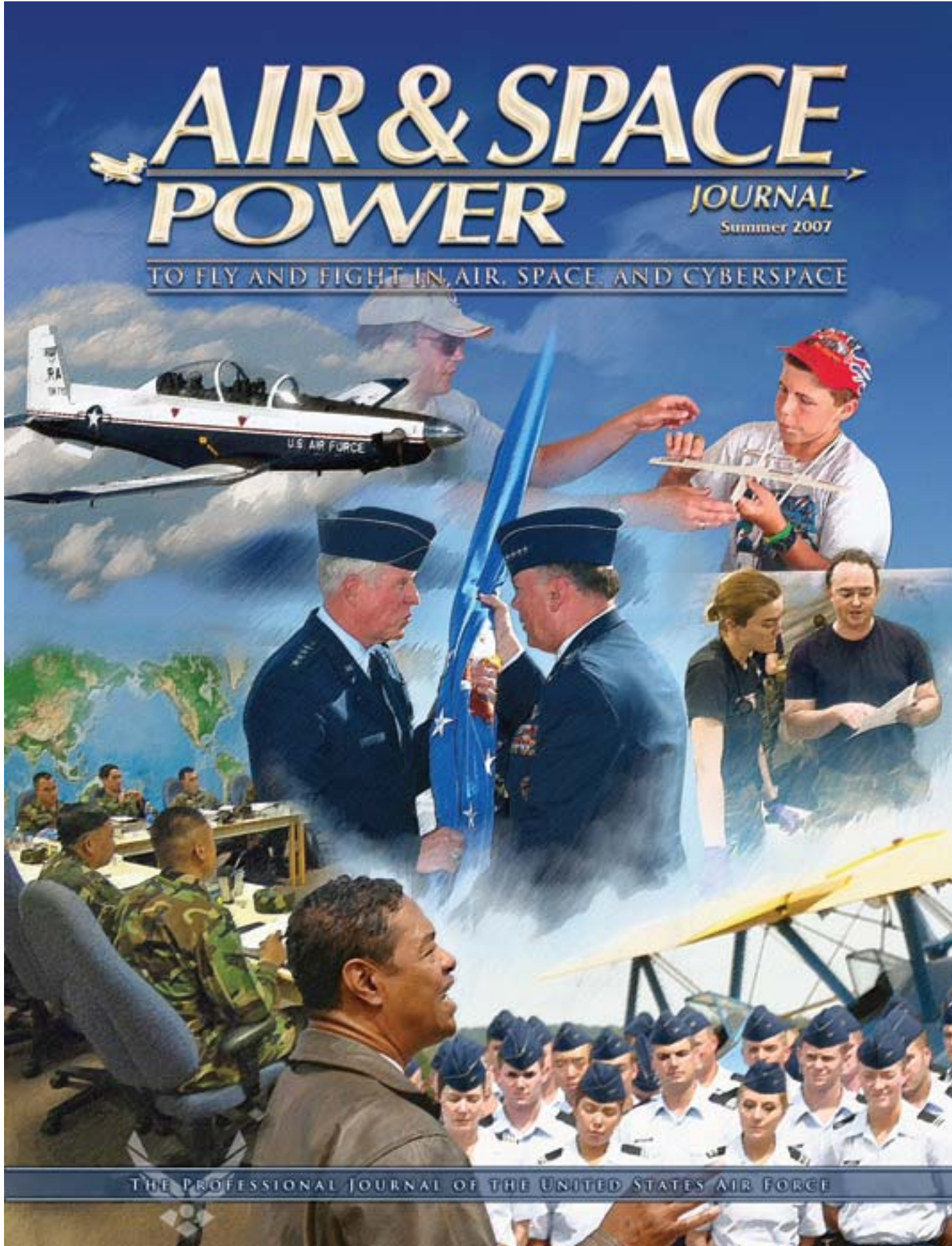

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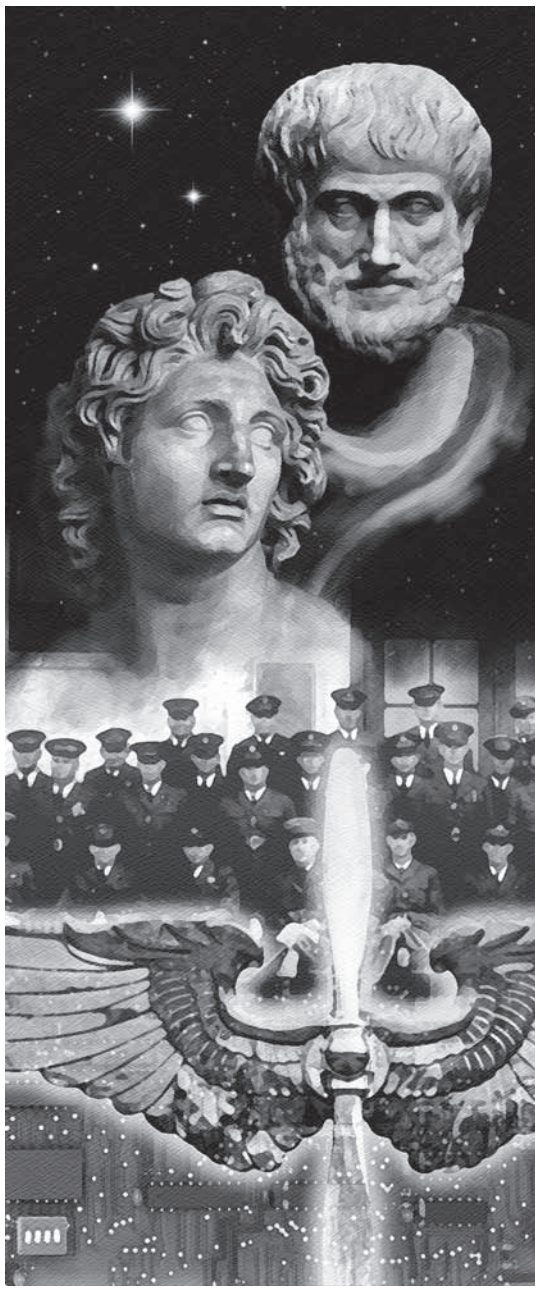

Transforming Air Force Education for the Long War and Beyond

Lt Gen Stephen R. Lorenz, USAF

AIR UNIVERSITY IS currently in the process of transforming for the "long war" and beyond. The idea of a university reorganizing for war may seem odd, but in the Western way of war, warriors and academics have always enjoyed a close relationship. The West's first great general, Alexander, was tutored by Aristotle, and when he went to war, he did so with academics in his train. According to noted military historian Victor Davis Hanson, the close relationship between warriors and scholars in the Western way of war is one of the main reasons for its success across the millennia.[1] In the US military, the connection between thinkers and fighters has become closer than ever, and exploiting this relationship to the fullest will prove key to winning the current war. Doing so, however, will require (1) understanding how military education differs from the traditional civilian model and (2) reorganizing our present system of military education to meet the emerging challenge.

The Unique Nature of Military Education

At its core, the US system of military education does not differ significantly from the civilian system. Both are based on the university

model of research and teaching that has dominated Western education for centuries. In this model, professors conduct research to push their fields forward. They produce books and articles that they subsequently teach to their students and, in the process, become better educators themselves. This procedure, which systematically turns out better students, faculty, and ideas, has played a significant role in the explosion of knowledge in the West and is largely responsible for the lightning pace of innovation in science and technology today.

Military education, however, differs from most academic fields in a number of ways. First, although hundreds or thousands of schools offer instruction in most fields of study, in the United States only a handful of joint/service schools teach military art and science. Further restricting the breadth of the field, for the most part only those schools associated with certain service sponsors have faculties knowledgeable about particular domains of war. Thus, for instance, we have only one air war college, one land war college, and one naval war college, a situation that places an enormous burden on service-school faculties to research and publish work related to the type of war for which their service is responsible. In most fields of study, if professors do not publish, they can fall back on books and articles published elsewhere to stay current and educate their students. At service schools, however, they are often the only game in town.

A second difference between military schools and the majority of civilian schools involves pure versus applied research. In most fields of study, professors write for academic audiences. Promotion, tenure, and other benefits come from moving academic debates forward. In the civilian world, outside of business, law, and engineering schools, writing for policy makers and practitioners may even have negative connotations since it might appear to sully an instructor's credentials as an unbiased observer. In military education, however, this relationship is reversed, with practitioners constituting our most important audiences. Military schools conduct, or should conduct, their most highly regarded research for policy makers in Washington, generals in the field, and students in the classroom. Though important, purely academic work does not have the pride of place it enjoys at civilian schools.

A third difference involves urgency. The ideas that we in a military university explore through research and the lessons we teach often pay off—for good or ill—much faster than in other fields of study. For instance, a school's decision about whether to drop classes on conventional war and add lessons on insurgency this semester or to wait for another year can mean the difference between life and death; its results will show up on the battlefield with the next graduating class. This fact can place more pressure on our schools to change curricula and on military professors to develop new areas of knowledge and expertise than is the norm at civilian schools.

A fourth difference concerns the need to educate a larger portion of our workforce. Both civilian and military sectors desire more educated workers, but we have a stronger impetus. In modern warfare, particularly during times of rapid change, education acts as a massive power multiplier. Today the US military needs flexible and innovative thinkers almost as much as it needs bombs and bullets. Yet realistically, until fairly recently, we have had enough resources to educate only a small fraction of the force. The issue of increasing the size of the educated force carries high stakes.

The Need for Change

Currently the United States finds itself in the midst of geopolitical changes that tax the flexibility of our system of military education. After 9/11, the nation's military schools worked to integrate lessons on terrorism into their curricula. As the war in Iraq heated up, they added seminars on insurgency. Yet today our schools face an underlying problem vastly greater than updating curricula and changing lessons. Essentially, we confront adaptable enemies who sometimes innovate faster than our own capacity to do so. Stateless organizational structures, ongoing cyber wars, and remote-controlled improvised explosive devices are only the most recent outputs of our

enemies' idea-generating systems. Using innovations produced by these systems, they have found ways to circumvent our ponderous Cold War military apparatus and have pinned down our forces across the globe. Their flexibility at times trumps our material advantages. All too often our enemies appear to be winning this war of innovation.

To answer our opponents, we must improve our system's ability to produce and disseminate new ideas. This new system must have two parts: it must systematically generate relevant new ideas, injecting them into national debates, and it must develop adaptive, innovative students who can continue the process after they leave our military schools.

Air University has begun to play a role in this war of ideas, but doing so requires significant changes. The core of our strategy here at Maxwell AFB, Alabama, calls for reenergizing the university model of research and teaching that so effectively propels innovation in the civilian sector. This approach is not new to the Air Force. Throughout the 1930s, the Air Corps Tactical School employed it in an effort to confront the specter of a rising Germany and Japan and to develop new uses for emerging airpower technology. Using a combination of theory, history, and field research, instructors at the school wrote the plan employed by the United States in World War II and educated Airmen who developed strategies used by the Air Force for the next half century. Unfortunately at some point during the Cold War, Air University reduced its emphasis on this spirit of innovation and outreach to national policy makers. For the most part, the Air Force outsourced service-related research on military strategy to independent think tanks, and the university became mainly a teaching school.

This neglect of innovation has proved costly to the nation as well as to our faculty and students. Although the Air Force remains the world leader in developing military technology, it lags behind the Army in its ability to produce and disseminate thoughts about how to use its new technology and ideas. By one count, for every book published on airpower today, five appear on ground-centered military solutions. In 2006 the Strategic Studies Institute—the Army War College's in-house think tank—produced 53 monographs, but during the same period, Air University's tiny think tank produced only two. When it comes to injecting ideas into national debates, we find ourselves similarly behind. For example, of the military experts regularly featured on Fox News and Cable News Network, soldiers outnumber airmen five to one, and the vast majority of newspaper articles on airpower derive from interviews with ground-power experts. This lack of research production also has secondary consequences. Today the percentage of Air University professors with a strong grasp of air, space, and cyberspace theory and history is small compared to the percentage of land-power experts at Army or Marine schools. At times this dearth of experience shows up in the classroom. I firmly believe that each military school has a duty to develop and disseminate new ideas about the ways its service can assist the nation and contribute to the joint fight in the long war. Air University has not done as well as it could in this area.

Transforming Air University for War

To bring us back into the war of ideas, Air University has begun changing the way it does business. We are treating this endeavor as part of the war effort. Success will require an integrated campaign involving numerous approaches.

First, we are reorganizing our command structure. Although the Air Force originally colocated its schools at Maxwell AFB specifically to develop synergies, at present little overlap exists among the schools. Primarily, a command structure with too large a span of control drives this lack of lateral communication. By centralizing staffs and decreasing such spans, we hope to increase synergy among the schools and enhance their accountability to our Air Force, the joint community, and the nation.

The second set of changes involves providing our instructors with greater resources and incentives to publish on topics related to air,

space, and cyberspace. To do this, we are building a new university research institute—an initiative taken by the other services decades ago with good results. We believe that this institute will go a long way toward generating and disseminating ideas about ways the Air Force can contribute to national security. In line with the university model of research and teaching, the institute will have a second purpose: giving Air University professors with innovative air-, space-, and cyberspace-oriented research agendas time away from the classroom to conduct their work. Doing so not only will increase our pool of researchers but also will improve our faculty—and hence the education we offer our students.

On a similar note, we are taking significant steps to give our professors incentives to conduct research on Air Force–related topics. Ironically, in the system that has evolved (partially because of the small audience for air-related publications), instructors often have greater incentives to research topics unrelated to the Air Force than to examine questions pertaining to air, space, and cyberspace. Similarly, publications aimed solely at academic readers often receive more credit than work intended for policy audiences. Beyond this, the knowledge and expertise that active duty students and instructors bring back fresh from the field often go unheeded because these warriors do not possess academic-level writing skills. To correct these problems, we are asking the schools to reconsider how they reward research and promote professors. Research specifically pertaining to ways that air, space, and cyberspace can contribute to the joint fight will receive the highest honors. Applied research—white papers, group endeavors, and similar projects—will receive as much credit as purely academic work. Skilled writers who coauthor with instructors and students possessing practical experience will receive as much credit as do those who prefer to work alone. These changes should help vector research toward the war effort.

Producing ideas, however, is not enough. To be effective, they must disseminate to the nation's intellectual centers, so we have launched a number of initiatives to facilitate this process. Every year our students and faculty write hundreds of papers—most of which either appear in forums read solely by academics or disappear onto library shelves. To correct this problem, we have begun to guide student research in directions that answer current questions related to the Department of Defense (DOD), Air Force, and joint community and to catalogue as well as track papers produced at Air University so that relevant audiences can locate them online. We have also created a requirement that students and faculty summarize their work in "blue darts"—short op-eds or influence articles—that we can forward to the DOD, joint service, or media audiences, as appropriate. Beyond this, we have begun to stand up special research teams that can rapidly respond to high-level research taskings, ensuring that DOD, joint, and Air Force policy makers can reach back to Air University for information and expert opinions.

On a more academic front, we have recently launched a new journal, *Strategic Studies Quarterly*, to help promote debate on high-level policy issues and have created a new online e-mail publication, *The Wright Stuff*, to quickly disseminate research and ideas to the Air Force audience and beyond. We are also experimenting with a number of other initiatives. We have begun to commission studies on important topics from well-known authors. In addition, we are once again sponsoring symposia that bring policy makers and academics together to discuss important issues and are partnering with civilian and military universities as well as think tanks to help stimulate research and debate on Air Force–related issues. Taken together, these steps and others like them should increase the flow of ideas dealing with air, space, and cyberspace to audiences that can use them. Over time these changes will substantially increase the number and quality of relevant new ideas flowing out of Air University. They will also help develop our faculty and improve the education we offer students.

The third approach aims directly at our student body. As the United States begins to understand the nature of the long war, the need for training in language and regional cultures has

become even more apparent. Accordingly, over the last year we have substantially increased our offerings in these areas. To support the Air Force's new cyber mission, the Air Force Institute of Technology will soon supplement its current graduate curriculum in cyber operations with a 12-month program in cyber warfare. Much like the Air Corps Tactical School's efforts to pioneer air war in the 1930s, this hands-on initiative engages faculty and students in a combined effort to develop technology and doctrine for fighting in cyberspace. We have also added to the number of courses in other relevant fields such as counterterrorism, counterinsurgency, space, and cyber warfare. Finally, we are currently in the process of revamping our Air and Space Basic Course to do a better job of building the confidence and a warrior ethos that will serve our junior officers for the rest of their careers.

Lastly, we are taking steps to add dramatically to the number of students we educate. Through partnerships with civilian schools, we have been able to exponentially increase the educational opportunities for enlisted Airmen. By 2008 we will begin to offer them the opportunity to pursue a bachelor's degree. Our new distance-learning program will soon allow us to give all officers a chance to pursue an Air University master's degree by the 12th year of their careers. We are also attempting to create a new Air University PhD in strategic studies—the first of its kind in the US military—that will greatly increase the pool of doctorate-holding officers from which the Air Force will draw its future senior leaders. Beyond this, we are making major changes in our education of junior officers and in our noncommissioned officer academies as well as taking advantage of new cyber technology to develop communities of practice for squadron commanders. Our goal in all of this is to increase vastly the number of flexible and innovative thinkers in the Air Force.

Conclusion

In sum, the United States has only now begun to come to grips with the nature of the long war and what lies beyond. Winning this war will require us to leverage our existing strengths. It will require new equipment, new tactics, and, from time to time, even new strategy. But it also requires something more. Our best hope for succeeding in this struggle lies in developing a system that institutionalizes innovation. More than anything else, we need new ideas as well as men and women who, understanding the problems we face, can innovate and adapt to overcome them. The system of military education we continue to pioneer at Air University will take a significant step toward developing this system and, over the long run, defeating our opponents. ❑

Note

1. Victor Davis Hanson, *Carnage and Culture: Landmark Battles in the Rise of Western Power* (New York: Doubleday, 2001), chap. 5.

Airpower's Crucial Role in Irregular Warfare

Maj Gen Allen G. Peck, USAF

Because the dominance of America's airpower in traditional wars has not been lost on those who threaten our national interests, we can logically expect them to turn increasingly to irregular warfare (IW). The ongoing conflicts in Iraq and Afghanistan reflect the ways that US military power has had to adapt and transform to meet new challenges presented by enemies who have respect for our conventional dominance and the determination to find exploitable seams in our capabilities.

Although the capabilities and effects that America's airpower brings to the fight are not as visible to the casual observer as the maneuvers of ground forces, airpower (including operations in the air, space, and cyberspace domains) remains an invaluable enabler for those forces. Airpower can also serve as a powerful IW capability in its own right, as it did early in Operation Enduring Freedom in Afghanistan. No one should dismiss IW as falling strictly within the purview of ground or special operations forces. Understanding the IW environment and, in particular, airpower's immense contributions is critical for America's future Air Force leaders, who will prove instrumental in ensuring that the service continues adapting to an ever-changing enemy and bringing relevant capabilities to bear in an ever-changing fight.

The Irregular Warfare Environment

Doctrine defines IW as "a violent struggle among state and non-state actors for legitimacy and influence over the relevant populations."[1] IW includes counterinsurgency operations and foreign internal defense (FID) (providing support to/for a regime, typically against internal foes) as well as support for insurgency operations. For example, al-Qaeda

and associated movements, in their quest for power and territory, will likely resort to IW methods, attacking perceived vulnerabilities in order to influence relevant audiences while avoiding direct confrontation with US, allied, or partner-nation forces. This type of warfare often takes a markedly different form from traditional, conventional warfare, requiring the addition of IW capabilities to the "tool kit" from which US forces can pull. At the same time, however, the Air Force cannot afford to lose its acknowledged edge in traditional warfare, which has enabled past military successes and will prove necessary in the future to maintain America's position as the world's superpower.

The long-war aspect of IW poses challenges to America's center of gravity—its willingness to bring considerable resources to bear and remain engaged in an extended fight. Historically, democracies tend to grow weary of fighting relatively quickly, as reflected in this country's experiences in the Civil War, Vietnam, and the present conflicts in Iraq and Afghanistan. Indeed, the network of radical Islamic extremists has produced a plan for a 100-year struggle, and democratic nations under their attack are showing signs of fatigue just a few years into the battle.[2] This long-war aspect has implications for today's Air Force; for instance, junior officers, operating today at the tactical level, may well be responsible for the strategic aspects of tomorrow's war. Not only must our Airmen have knowledge of airpower capabilities in IW, but also they must articulate airpower concepts as well as educate the joint and coalition communities on the weapons and skills that airpower brings to the fight.

Airpower's Asymmetric Advantages

In an IW environment, the traditionally recognized ability of airpower to strike at the adversary's "strategic center of gravity" will likely have less relevance due to the decentralized and diffuse nature of the enemy.[3] The amorphous mass of ideological movements opposing Western influence and values generally lacks a defined command structure that airpower can attack with predictable effects. Still, airpower holds a number of asymmetric trump cards (capabilities the enemy can neither meet with parity nor counter in kind). For instance, airpower's ability to conduct precision strikes across the globe can play an important role in counterinsurgency operations. Numerous other advantages (including information and cyber operations; intelligence, surveillance, and reconnaissance [ISR]; and global mobility) have already proven just as important. These capabilities provide our fighting forces with highly asymmetric advantages in the IW environment.

Innovation and adaptation are hallmarks of airpower. Cold War–era bombers, designed to carry nuclear weapons, can loiter for hours over the battlefield and deliver individual conventional weapons to within a few feet of specified coordinates. Fighter aircraft, designed to deliver precision weapons against hardened targets, can disseminate targeting-pod video directly to an Air Force joint terminal attack controller who can then direct a strike guided by either laser or the global positioning system (GPS). Unmanned systems such as the Predator, once solely a surveillance platform, now have effective laser designation and the capacity for precision, kinetic strike. Airborne platforms offer electronic protection to ground forces, including attacking insurgent communications and the electronics associated with triggering improvised explosive devices (IED). Exploiting altitude, speed, and range, airborne platforms can create these effects, unconstrained by terrain or artificial boundaries between units. Forward-thinking Airmen developed these innovations by using adaptive tactics, techniques, procedures, and equipment to counter a thinking, adaptive enemy.

To be sure, our IW adversaries have their own asymmetric capabilities such as suicide bombers, IEDs, and the appropriation of civilian residences, mosques, and hospitals as staging areas for their combat operations. However, they lack and cannot effectively offset unfettered access to the high ground that superiority in air, space, and cyberspace provides.

Airpower's Contributions—Today and Tomorrow

US airpower, in its myriad forms, is currently operating simultaneously in multiple theaters, producing invaluable combat and enabling effects across the board. For instance, the Air Force has engaged in a wide spectrum of combat operations in Southwest Asia for more than 15 years, and over 25,000 Airmen are currently deployed to US Central Command's area of responsibility. Airpower's capabilities have been—and will continue to be—integral to the success of US military power in this theater and in the global war on terror writ large, a fact often overlooked in accounts that focus on the more readily visible aspects of war. Nevertheless, when properly integrated with other military and civil efforts under the rubric of IW, airpower consistently delivers effects critical to winning the overall joint fight and meeting the campaign's overarching military and political objectives.

A number of the fundamental tenets of airpower have proven particularly valuable in enabling the Air Force to bring its most potent asymmetric strengths to bear in ongoing operations. Perhaps first and foremost amongst these is the application of airpower via centralized control and decentralized execution. This imperative for centralizing planning and direction while decentralizing tactical-employment decisions has as much applicability to IW as to traditional warfare operations. The rationale for this fundamental belief should roll off a professional Airman's tongue as easily as, say, a Marine officer would justify the inviolability of the Marine air-ground task force. By incorporating all assets under a single commander, Air Force forces and joint force air component commander (JFACC), the air component can both effectively and efficiently allocate limited airpower resources to cover competing requirements from multiple war-fighting commanders across the theater while maintaining a vigilant focus on broader goals. The fire hose of effects available from airpower operations can be focused where and when needed, according to the priorities established by the joint force commander. Decisions regarding particular employment methods and tactics will reside at a lower level, closer to the fight and to the knowledge of what is needed.

Today, air-component forces provide the following: kinetic effects from fighters, bombers, and unmanned systems; ISR that uses a variety of air-breathing, space, and nontraditional sensors; electronic-warfare platforms; and airlift/airdrop capabilities, which can range practically anywhere across Iraq and Afghanistan, provided they have not been "penny-packeted" to individual units. Most of airpower's contributions in Iraq focus on support for ground forces, but unique abilities allow it to conduct both interdependent and independent operations.

In this regard, airpower offers a wide spectrum of asymmetric capabilities that we can focus and direct as necessary, creating effects such as kinetic destruction, persistent ISR collection/dissemination (including air-breathing and space-based as well as manned and unmanned), infiltrating/exfiltrating forces and supplies, and attacks on computer networks and support infrastructures. All of this is available on an as-needed basis, almost without regard for geography or artificial surface boundaries.

Since the beginning of Operations Iraqi Freedom and Enduring Freedom, Central Command's air component has flown over a half million combat and combat-support sorties. Though impressive, that number does not tell the whole story. First, many of these sorties are of long duration, supplying unprecedented persistence and presence overhead, ultimately enabled through a combination of air refueling and forward basing. One cannot underestimate the criticality of being able to choose from among a variety of weapons and tools and respond rapidly, particularly in an IW environment in which the enemy very often dictates the time, place, and nature of attacks. Second, and more importantly, sortie counts or similar metrics cannot readily depict many of the effects that the Air Force brings to the fight. Although impressive, statistics represent only one part of the Air Force's contribution in today's war. We must not overlook either

the robust intelligence analysis and dissemination capabilities that leverage the unprecedented collection afforded by today's Air Force systems or the communications-enabling functions that make global warfare as seamless as if it were in our own backyard.

Employing Airpower's Capabilities

Space-based assets rank among the least understood and recognized of the Air Force's war-fighting contributions. Vital intelligence, communications, weather, and navigation capabilities all rely heavily on assured access to space. Space-based force multipliers are proving immensely valuable at the lower end of the conflict spectrum. Take for example the GPS—it is not only critical to providing guidance for precision munitions but also vital to reporting the geolocation of friendly troops, insurgents, and civilians. Precision location allows more rapid responses for close air support, combat search and rescue, casualty evacuation, and prosecution of time-sensitive targets. Yet, a determined, capable adversary could challenge access to space, as the Chinese reminded the rest of the world with their recent antisatellite demonstration.

Intelligence made available by air and space forces serves as a critical enabler in IW. In traditional warfare, larger yields and/or quantities of weapons can compensate for targeting uncertainties, but this is generally not the case in counterinsurgency operations, in which unintended collateral damage can undermine support for the government and become a recruiting tool for the insurgency. Currently, over both Afghanistan and Iraq, space-based and air-breathing assets alike continuously monitor the situation on the ground, helping identify insurgents as well as their organizational networks, supporters, and lines of communication and supply. These platforms collect and disseminate a variety of intelligence (signals, communications, imagery, moving-target, full-motion-video, etc.), all integral to the fight. Overhead assets also contribute significantly to the emerging field of forensic analysis, which involves backtracking from ongoing events to determine the sources from which they emanated (e.g., tracing back from explosions of IEDs to locate the bomb-making organizations and facilities that support them). In both Iraq and Afghanistan, airborne assets have developed the capacity to respond quickly to determine the launch points of mortar or rocket attacks, identify suspicious individuals/vehicles and mark them with laser designators for apprehension by ground forces, or, in many cases, destroy them outright. As with other airpower applications, centralized control of intelligence platforms (which minimizes duplication of effort and ensures support for the joint force commander's highest-priority requirements) enables effective and efficient use of limited ISR assets—key elements of the coalition's asymmetric advantage in IW. For example, effective ISR enables the air component to bring airpower to bear in support of small coalition or indigenous ground-force units, magnifying their organic capabilities.

Precision strike, another highly effective tool of counterinsurgency, permits us to eliminate insurgents in close proximity to civilians or friendly ground forces, thus giving coalition forces a significant firepower advantage. Highly accurate guidance systems, cockpit-selectable fuzes, and munitions of various explosive yields allow Airmen to deliver intended effects precisely while limiting unintended effects. Of course, in certain situations we may need to attack large areas with less discriminate use of firepower—a task for which airpower is also well suited.

Air mobility offers another edge in counterinsurgent operations. Our forces exercise this advantage over surface-bound IW adversaries by transporting personnel and cargo while bypassing contested lines of communications, air-dropping supplies, and quickly evacuating the wounded. In Iraqi Freedom and Enduring Freedom last year, the air component flew over 50,000 airlift sorties, transporting over 1,000,000 personnel and 90,000 pallets of cargo that otherwise would have moved via slower, more vulnerable ground-based means of transportation. The mobility advantage also enables the infiltration, resupply, and exfiltra-

tion of relatively small ground units. By providing humanitarian assistance, medical support, and transportation for government officials to remote areas, airpower can promote the government's credibility and improve the quality of life for its population. These types of operations, which directly affect and are immediately visible to the population in question, can have significant effects in the overall campaign against the insurgents.

Coupled with relatively small numbers of coalition and indigenous forces, airpower can bring a full spectrum of effects to bear, from humanitarian to electronic to kinetic. In some cases, the mere visible or audible presence of airpower can demonstrate commitment to a population and support to a government as well as shape the behavior of insurgents by reducing their freedom of movement and denying them sanctuaries.

Assisting Partner Nations' Air Forces

The Air Force's FID, which includes military programs that support partner nations' strategy for internal defense and development, primarily seeks to develop and sustain the airpower capabilities of those nations. By building partnerships in this way, the United States helps shape the strategic environment and impede potential terrorists from gaining a foothold in these countries. Ultimately, increasing partner nations' ability to counter irregular threats allows them to fight more effectively, enhance their legitimacy, and reduce their dependence on US forces.

Currently the Air Force provides education and training essential to resurrecting the air forces of Iraq and Afghanistan. Despite getting off to a slow start, the nascent Iraqi air force is conducting rudimentary ISR and mobility missions. Operating Al Muthana Air Base (a section of Baghdad International Airport), it plans to take over activities at several other bases. US forces continue to train Iraqis in support functions needed to maintain and protect their aircraft and bases. Furthermore, they are helping develop an indigenous ability to provide air surveillance and air traffic control over sovereign airspace—an essential part of any coalition exit strategy since partner nations will need support from coalition air forces until they can independently conduct their own operations and defend their airspace. In this age of increasing emphasis on IW, the Air Force's FID capabilities will likely receive greater emphasis and resources.

Planning, tasking, executing, and assessing combat operations are the JFACC's forte. Clearly, planning and executing phase four (stabilize) and phase five (enable civil authority) operations pose unique challenges for the air component.[4] An understanding of how to help rebuild a partner nation's airpower (including complexities of legislation and funding for foreign military assistance, aspirations of partner nations, and opportunities for coalition contributions) constitutes one potential IW emphasis area for educating and training Airmen. The Air Force's FID force structure may also need a relook with an eye towards improving the capacity to rebuild partner nations' air forces; for example, it is no coincidence that the most successful asset of the Iraqi air force, the C-130, is the only aircraft type it has in common with the US Air Force.

Developing Airmen for Irregular Warfare

Force development is a function of education, training, and experience, with an objective of producing adaptive, creative, and knowledge-enabled Airmen. Our Airmen not only must know and articulate what their service brings to the IW fight today, but also must think "outside the box"—an ability that will enable them to lead and direct the Air Force of the future. Our service must continue to adapt and leverage its asymmetric capabilities against those adversaries engaged in IW against the United States and its allies. Fortunately, adaptability and an inherent capacity for thinking above the fray are ingrained in the genetic code of Airmen. Likewise, flexibility is built into the platforms with which they wage war. Developing bright, innovative, highly capable

leaders who will continue this tradition of flexibility is essential to ensure that airpower maintains a place at the fore of IW conflicts.

Our Airmen must receive training and education in the capabilities and limitations of airpower; moreover, they must unapologetically articulate airpower concepts and doctrine to the joint community, members of other services, and personnel assigned to other government agencies. Numerous ongoing initiatives focus on educating our Airmen on aspects of IW in which US airpower plays a direct role and makes a direct contribution, such as the effort initiated by the Air Force chief of staff to identify and/or train Airmen who have a solid understanding of foreign cultures and languages. In addition, expanded training programs for new recruits, increased emphasis on predeployment training for combat-support personnel, and enhanced flying training for aviators and Battlefield Airmen based on warfighting lessons learned all reflect the new realities of IW. Just as Airmen can survive and kill the enemy at great distances from the air, so must they have the training and motivation to survive and kill at close range on the ground.

Air Force doctrine will also play a significant role in educating Airmen. Consisting of the fundamental principles by which military forces guide their actions in support of national objectives, doctrine shapes the manner in which the Air Force organizes, trains, equips, and sustains its forces, preparing war fighters for future uncertainties and giving them a common set of understandings on which to base their decisions. Currently the Air Force is revising the existing version of AFDD 2-3.1, *Foreign Internal Defense*, 10 May 2004, and developing a new doctrinal keystone publication: AFDD 2-3, *Irregular Warfare*, which will codify how the Air Force approaches IW, including its capabilities and contributions to counterinsurgency operations. This document will also form the basis of our service's position as the joint community tackles the important business of writing doctrine on counterinsurgency. All of the aforementioned initiatives are designed to create a core of IW leaders and experts upon which the Air Force can rely.

Conclusion

America and its military are at war; the current threat posed by global terrorists, potentially armed with weapons of mass destruction, is as great as previous threats to our way of life posed by Nazism, fascism, and communism. Coalition and partner-nation forces join the United States in this effort. The US Air Force provides air, space, and cyber power as part of the joint and coalition war-fighting team, dedicated to winning the conflicts in Iraq and Afghanistan while simultaneously protecting the vital interests of our nation and the coalition in which it operates. Airpower, in all its forms, brings a vast array of direct-effect weapons and joint-force enablers to the fray, a fact not always clearly recognized or portrayed in the press. Although it is not so important that audiences properly attribute progress in the global war on terror to particular components or services, it is important that Air Force Airmen know and articulate our resident asymmetric capabilities and that they use their knowledge and expertise to ensure that our service remains as relevant to tomorrow's fight as it is to today's. ❑

Notes

1. "Irregular Warfare Joint Operating Concept," draft version 1.0, January 2007, 4.

2. Rear Adm William D. Sullivan, vice-director, Strategic Plans and Policy, Joint Chiefs of Staff, *Fighting the Long War—Military Strategy for the War on Terrorism*, briefing slide 9, February 2006, http://www.au.af.mil/au/awc/awcgate/jcs/jcslongwar_12jan06_j5.pdf (accessed 15 January 2007).

3. The strategic center of gravity is a source of power that provides moral or physical strength, freedom of action, or will to act.

4. Joint Publication 3.0, *Joint Operations*, 17 September 2006, IV-25 through IV-29, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_0.pdf.

Leadership

An Old Dog's View

C. R. Anderegg

GRAY IN THE muzzle and gimpy in the hips, I slowly walk to the rag rug next to the hearth where I turn in two tight circles, ease myself down, haunches first, and then stretch my front legs out, putting my chin on them. I've pulled all the sleds there are to pull. To all the places there are to pull them to, stretching from the wildest frontiers to the fanciest boomtowns. Two dogs, four dogs—even eight- and 12-dog teams. Straining at the harness until it cuts, paws filled with razors of ice, and breath huffing in huge clouds of steam. With my brothers' shoulders brushing against mine, we have lunged and pulled together, and together we have felt the reward of nothing more complicated than brotherhood—the simplest of words and the hardest to achieve. I look up at you, fresh from your initial training and eager to make your first pull across the high passes, and I think, "I could tell you everything, but then where would be the fun in discovering for yourself?" But some of it I must tell you because I want you to be better than I.

Our world is harsh. A mistake can cost a life. Or even a whole team, tumbling as one into the maw of a crevasse, gone forever in the blink of an eye. And we neither get nor seek

mercy from the cruel opponent against whom we struggle—the blinding white cold that is always hoping that we will slip. Yet we pull together, my brothers and sisters and I, and we take care of each other. It is the reward of our kind to feel unseen bonds of buddy love while we pull the load to the end of the track. And sometimes there is a pat on the head, but it is not the worldly rewards we seek. We pull because we are bred to it, and trained to it, and because an old man near the sea might have said, "It is a lovely thing to do."

Although we struggle through blizzards and soaring mountain passes as a team, we depend on the leader. Our leader may not be the strongest or the swiftest or the smartest, but he or she has proved one thing over and over—we will follow.

As I lie here, feeling the fire's warmth soothe the aches and ravages of a lifetime on the trail, I can reflect on the virtues—and the pitfalls—of being the leader. Things that you must learn, finally, on your own. But I can help you learn them more quickly if you will listen and understand the words of the old dog that has pulled from every position on the team and—yes, even a few times, a few glorious times—has lived the joy of pulling from the lead and getting the job done.

Before you can earn the respect to lead us, you must first be an excellent follower, and the excellent follower is always first: the first out of a warm bed, the first away from the breakfast bowl, the first ready to harness up, and the first to encourage the dog beside him or her. Most importantly, though, you must be the first to study. What is the meaning of the weather? The high clouds? The south wind and the north? How does the team pull on the soft snow? The wet? The ice? One must know our enemy, the cold, better than we know our own pack.

It is not enough, though, to be the first as a follower; you must also be the last. The last to complain. The last to sit down. The last to sleep. And always, always, the last to ask, "Why me?"

As you study, it is natural that you seek out the best teacher, and his name is Failure. We learn nothing from our successes. A short romp on a soft trail with a light load is quickly forgotten. Do you think I am a leader? Look at the scars on my face—the missing tip of my ear, gone to the single swipe of a vicious mother whose cub I bothered. This is not the face of success; this is the face of life, of lessons learned, and, alas, relearned. You will suffer these failures too. And each of them will make you stronger and able to pull longer and harder than ever. Until time catches up with you—and there's no cure for that.

Along the way, though, continue to study. Make time to study. See how the Inuit's dogs run, but the trapper's are different—perhaps not as fast but with more stamina. While you pull as a follower, learn from them; learn from them all. You must study how the sled skids in the turn and how those in front, behind, and beside you react. Does your brother shy from the knife of the cold wind? Does your sister pull you off balance? There is precious little time to learn before you will be thrust into the front.

You will learn that there are different kinds of lead dogs. Some look at their team as a blessing, a team that can get the job done and done safely. Others look at the team as a burden, a group of ne'er-do-wells that need to be constantly nipped. But I don't have time to think about the snarlers and nippers because their teams, sadly, fail when the stakes are high. I want you to know what I know before I curl up and sleep while you go out into the cutting wind.

As the lead dog, you must work the hardest. The house dogs think that the lead position is the easiest—that the traces in the rear must be the tautest while the lead dog needs only to "guide" the team, his harness loose and comfortable. This might work on a clear day over an easy trail, but not when the job is tough. Recall your days in the back, when every ounce of strength from the whole team was needed. A slacker is a liability; a leader who is a slacker could be a calamity.

As the lead dog, you must be the disciplinarian, even sometimes during the run—but the best time is later, away from the team. Remember that your goal is to improve behavior; a chastened dog will pull hard to regain his spot on the team, but a humiliated dog is ruined forever. Before you growl at the errant

one, look first to yourself. Did you train the offender properly? Did you provide the right equipment? Almost all of us will pull 'til our hearts burst; if one does not, then it is more often the fault of training or equipment rather than attitude. But discipline when you must; no one else will do it because it is your job.

The character you build as a follower is the one that comes through as a leader when the trail is icy, the wind is brutal, and the sled is top-heavy. It is no time to be a loner, or sloppy, or shortsighted. Take heart from my experience: a leader can build character in the team. He or she need only show its members the benefits of hard work, courage, selflessness, devotion, and excellence, and to these things they will respond with their whole hearts.

You must know what you stand for before the trail becomes difficult. Do you believe in your man? In your team? Will you die in the traces for them? Ask these questions now because when the white bear circles your camp at night and then rushes in, a howling, slashing specter of evil, it is too late. You must be ready to fight in an instant or risk whimpering away with your tail between your legs.

I have saved for last the most important thing you must learn, and that is integrity. The leader is the first into the traces and the last out. The leader eats last and eats least. The leader treats every member of the team with meticulous fairness. The leader encourages affection for the team but never for himself or herself. The leader is honest, and this bears repeating—the leader is honest. More than any power the leader has, the leader is most judicious with the authority to lead the team into harm's way.

Now you must go and lead the team while I rest. You have studied hard and learned much during your life as a follower. During the long winter nights, you have curled up close to the team and heard the telling and retelling of the stories of how our proud breed evolved into the best that anyone has ever seen. Your dreams have felt the agony of crossing the high passes and the joys of pups in the spring. Your history will make you wise, and your heritage will make you proud. Do not be afraid to fail. As the scars accumulate on your head, let them remind you of the difficult life you have chosen and the glorious battles it brought.

I trust you. ❑

As your secretary, I am committed to boosting your regional, cultural, and language skills to make you a more capable ambassador so that you can help build lasting, long-term relationships with our allies and coalition partners.

—Hon. Michael W. Wynne, Secretary of the Air Force

Lt Col Paul D. Berg, USAF, Chief, Professional Journals

Introducing the Chinese *ASPJ* and Presenting the Latest *Chronicles Online Journal* Articles

THE US AIR Force began publishing the English version of *Air and Space Power Journal* (*ASPJ*) in 1947. To expand its language and cultural outreach, the service launched Spanish and Portuguese editions in 1949 as well as Arabic and French ones in 2005. We are now pleased to announce the imminent debut of the Chinese *ASPJ*, designed to encourage professional dialogue between Chinese-speaking military and government members worldwide.

Each *ASPJ* editor is a regional expert and native speaker who tailors his journal's content to audience interests. The new Chinese *ASPJ* editor, Mr. Guocheng Jiang, has impressive credentials. He grew up in China, living through both the Great Famine of the early 1960s and the Cultural Revolution of the late 1960s. In the 1970s, he was "reeducated" in the countryside for three years before becoming a "worker-peasant-soldier" student at the Shanghai Institute of Foreign Languages.[1] In the subsequent era of economic reform, Mr. Jiang became deeply involved in several high-profile industrial projects in partnership with foreign companies. As a journalist and chief interpreter, he covered foreign technological developments and authored several pioneering papers about contract negotiation and writing. After earning his first master's degree from Nanjing Normal University, Mr. Jiang taught English to graduate students. He then joined Yilin Publishing House, where he wore two hats—one as a technical editor and another as the author of two books about economic topics. His book *Gate to GATT* received immediate acclaim in business and language-teaching circles.[2] Mr. Jiang later emigrated to the United States, where he attended Johns Hopkins University and completed a second master's degree in 1996. He then worked for about 10 years in the US publication and software industries. His extensive experience in China and the United States will help him promote the constructive exchange of ideas between the Chinese and American militaries.

For the inaugural edition of the Chinese *ASPJ*, Mr. Jiang has selected and translated previously published articles about military transformation, strategy, and education. He is soliciting articles from Chinese-speaking airmen worldwide and will publish them in upcoming quarterly issues as they become available.

The established *ASPJ* editions serve the needs of military services in over 90 countries worldwide, where air forces, armies, and navies use the *Journal*'s articles for instructional purposes in academies and staff colleges. Officials of foreign governments also find them useful. We hope that the new Chinese *ASPJ* will prove equally valuable.

All *ASPJ* editions promote professional dialogue among airmen throughout the world so that we can harness the best ideas about air, space, and cyberspace power. *Chronicles Online Journal* (*COJ*) complements the printed editions of *ASPJ* but appears only in electronic form. Not subject to any fixed publication schedule, *COJ* can publish timely articles anytime about a broad range of military topics and can accommodate articles too lengthy for inclusion in the printed journals.

Articles appearing in *COJ* are frequently republished elsewhere. The various *ASPJ* editions routinely translate and print them. Book editors select them as book chapters, and college professors use them in the classroom. We are pleased to present the following recent *COJ* articles (available at http://www.airpower.maxwell.af.mil/airchronicles/cc.html):

- Lt Col Richard S. Tracey, USA, retired, "Trapped by a Mindset: The Iraq WMD Intelligence Failure" (http://www.airpower.maxwell.af.mil/airchronicles/cc/tracey.html)
- Maj Joseph T. Benson, USAF, "Weather and the Wreckage at Desert-One" (http://www.airpower.maxwell.af.mil/airchronicles/cc/benson.html)

The *ASPJ* staff seeks insightful articles and book reviews from anywhere in the world. We offer both hard-copy and electronic-publication opportunities in English, Spanish, Portuguese, Arabic, French, and Chinese. To submit an article in any of our languages, please refer to the submission guidelines at http://www.airpower.maxwell.af.mil/airchronicles/howto1.html. To write a book review, please see the guidelines at http://www.airpower.maxwell.af.mil/airchronicles/bookrev/bkrevguide.html. ❑

Notes

1. The term *reeducated* refers to a national movement from 1968 to 1975 that called for sending millions of urban students to the countryside for reeducation by peasants. These students faced tremendous challenges. Worker-peasant-soldier students reflected Mao Tse-tung's policy, in effect from 1972 to 1976, of sending youths with practical job experience to college without requiring college examinations.

2. The General Agreement on Tariffs and Trade (GATT) later became the World Trade Organization.

Ricochets and Replies

We encourage you to send your comments to us, preferably via e-mail at aspj@maxwell.af.mil. You may also send letters to the Editor, Air and Space Power Journal*, 401 Chennault Circle, Maxwell AFB AL 36112-6004. We reserve the right to edit the material for overall length.*

SERVICE BEFORE SELF OR SELF-SERVICE?

I liked Dr. David Mets's excellent, to-the-point, and insightful article "Service before Self or Self Service? Some Fodder for Your Reading on the Professional Ethics of Air Warriors" (Spring 2007). I especially liked the quick-reference rundown on which authors are moral absolutists and which are relativists, as well as the reasons why; the pros and cons of each book, author, and premise; and, most importantly, why that book (or another by the same author) is relevant for warriors. Additionally, Dr. Mets's writing style is easy to read. Most often, articles on philosophy are full of complex topics further complicated by convoluted language designed to make the author seem smart rather than get his point across. Such is not the case here, and I appreciate it. Even a knuckle-dragging fighter pilot walked away more informed.

Lt Col Peter S. "Shadow" Ford, USAF
Tyndall AFB, Florida

AN UNTAPPED RESOURCE FOR STABILIZATION AND RECONSTRUCTION

In his article "An Untapped Resource for Stabilization and Reconstruction: The United

States Air Force" (Spring 2007), Maj William Fischer does an admirable job of summarizing the challenges of postconflict operations and discussing roles and responsibilities of the military as they relate to those operations. His call for a reassessment of military roles in stability and reconstruction (S&R) operations after the shooting stops is most timely. Perhaps most noteworthy, his identification of the need for greatly expanding the combined civil-military training experiences highlights a glaring deficiency in current Department of Defense (DOD) training practices. Disappointingly, the article falls flat at the end. The On-Scene Commanders' Course is specifically designed for crisis-management requirements during and immediately after an isolated incident. Over time, the course has evolved to meet the doctrinal training requirements for an on-scene commander (OSC) to operate as delineated within the National Incident Management System (NIMS). Particularly relevant to the author's recommendation to expand the course is the fact that the OSC's function fades away as an incident stabilizes and as criminal investigative services and infrastructure-reconstitution teams begin their restorative efforts. S&R activities fall into what the NIMS calls "consequence management." These actions require a diverse set of actors and may last a few weeks, in the case of a Class A F-16 mishap, or several years, as demonstrated in both post-Saddam Iraq and the post-Katrina Gulf Coast. Put simply, the On-Scene Commanders' Course does not prepare leaders to function in consequence management. The cat-herding skills required of a consequence-management leader are currently more available in the diplomatic corps and commercial construction-program management firms than in the DOD's officer corps. There are more effective ways to train field-grade and future general-officer leaders to function in consequence management. Serving multiyear assignments with the US Agency for International Development or while "loaned" to the State Department at embassies/consulates in developing countries would help prepare current junior-level and midlevel officers to function in S&R. And we should immediately incorporate S&R training in the curricula of the service academies while using the Reserve Officer Training Corps program to bring in officers—to both the active and reserve components—who are academically trained in the skills needed in S&R operations. I realize that my proposal would necessitate a years-long, multibillion-dollar program of retraining and culture change, but throwing the rudder hard-over while at flank speed only violently rearranges the occupants and equipment on deck. Course changes take time. I applaud Major Fischer for making a plausible initial proposal. A vigorous debate is now needed to develop his ideas.

Lt Col Allen R. Naugle, USAF
San Antonio, Texas

JOINT CLOSE AIR SUPPORT TRANSFORMED

Lt Col Richard Bohn's article "Joint Close Air Support Transformed" (Spring 2007) has a few shortcomings. As Colonel Bohn begins his argument, he briefly mentions the joint close air support (JCAS) memorandum of agreement (MOA) signed by all the services and US Special Operations Command (USSOCOM) in September 2004. We agree with the author that the existence of that MOA clearly indicates joint military interest in JCAS. However, the MOA's actual text offers very little guidance for tactics, techniques, and procedures. Rather, it deals almost exclusively with standardization of joint terminal attack controller (JTAC) training, certification, and currency. Colonel Bohn mischaracterizes the intent of the MOA.

He also misses some key elements in his discussion regarding Air Force JTAC support to conventional Army units and the joint community's special operations forces (SOF). In his math, only Air Force tactical air control party (TACP) units supply non-SOF qualified JTACs to SOF. In reality, Air Force Special Operations Command (AFSOC) is tasked via USSOCOM to organize, train, and equip special-tactics combat controllers to perform the JTAC mission. JTAC-certified combat controllers habitually integrate with Army, Navy, and coalition SOF and have conducted JCAS

operations with distinctive success since the very beginning of Operations Enduring Freedom and Iraqi Freedom. To meet increased demand on the current and future battlefield, AFSOC's special-tactics forces are methodically growing in number while maintaining exceptional capability. Even prior to the global war on terrorism, AFSOC's special operators earned fierce reputations as quiet professionals through exercises and contingency deployments with their joint SOF counterparts, but Colonel Bohn overlooks AFSOC's contributions to the JTAC mission.

The author also states that "these Airmen do not have the training to operate like special forces personnel" (p. 59). We deem it a disservice to those courageous, highly qualified enlisted and commissioned-officer JTACs currently engaged in the fight alongside their SOF counterparts to describe them as less than capable or somehow lacking in ability. We urge the author to reconsider his assessment of the quality of Air Force JTACs.

Maj Jerry Kung, USAF
Hurlburt Field, Florida

Maj Michael Martin, USAF
Maxwell AFB, Alabama

LEADING THE TWENTY-FIRST-CENTURY AIR FORCE

I just finished reading Lt Col Paul D. Berg's "Focus Area" piece titled "Leading the Twenty-first-Century Air Force" (Winter 2006) and could not agree more. The very foundation of our leadership must be the Air Force's core values. In June 2004, we senior noncommissioned officers (SNCO) at Altus AFB, Oklahoma, began a focused investment in our people as we leveraged our skills, talents, and experiences to transform our wing Airmen into future strategic enlisted leaders. We SNCOs lead from the front, take care of the troops, and serve as role models for our Airmen. Air Force Instruction 36-2618, *The Enlisted Force Structure*, 1 December 2004, says that SNCOs should "be . . . active, visible leader[s]. Develop their NCOs into better leaders and supervisors. Deliberately grow and prepare their NCOs to be effective future SNCOs" (11). Our ultimate vision at Altus was to produce Airmen who are even better than those currently on active duty. We sought to develop Airmen whose very core is infused with the Air Force core values because that will prepare them to face the challenges of tomorrow's volatile, uncertain, complex, and ambiguous combat environment. We accepted the challenge and pressed on towards the goal. Our consolidated efforts produced a developmental infrastructure we call Airmen's Time. For more information about our efforts at Altus, see https://wwwd.my.af.mil/afknprod/ASPs/CoP/OpenCoP.asp?Filter=OO-ED-AE-32. To learn how we continued our work at Ali Al Salem Air Base, Kuwait, see https://wwwd.my.af.mil/afknprod/ASPs/CoP/OpenCoP.asp?Filter=OO-ED-AC-24.

CMSgt Thomas S. Narofsky, USAF
Ali Al Salem Air Base, Kuwait

MOLECULAR NANOTECHNOLOGY AND NATIONAL SECURITY

I read with great interest LCDR Thomas D. Vandermolen's article "Molecular Nanotechnology and National Security" (Fall 2006), which addressed mankind's admirable degree of technical development. I hope that this technical knowledge will be accompanied by high moral values so that its use may promote human development. Since I'm devoted to medicine, I'm always interested in reading articles about technological advances, many of which are occurring at an astonishing rate. Congratulations to Commander Vandermolen for his excellent work.

Dr. Manoel A. Moraes
Johnson City, Tennessee

Editor's Note: Dr. Moraes read the Portuguese version of Commander Vandermolen's article, available at http://www.airpower.maxwell.af.mil/apjinternational/apj-p/2006/3tri06/vandermolen.html.

In his article "Molecular Nanotechnology and National Security," Commander Vandermolen recommends intense regulation. At the same time, he indicates fairly clearly that the United States would be seen as a pariah if it alone

gained molecular nanotechnology (MNT) capability. I'm not sure that I understand the either/or position. It would seem to me that, given the strategic importance of MNT as an extraordinarily disruptive technology advance, which appears inevitable in some fashion, the United States should actually try to drive its own "MNT Manhattan Project." The development of nuclear capacity, coupled with our military, economic, and international regulatory capacities, has governed our security since World War II. Wouldn't you rather have the United States in the driver's seat for the next technological revolution? Thanks for the thoughtful article.

Eric Bauswell
San Jose, California

MOLECULAR NANOTECHNOLOGY AND NATIONAL SECURITY: THE AUTHOR RESPONDS

An "MNT Manhattan Project" (MMP) may be a great idea, depending on its purpose. Is its purpose to secure US influence in an international-control regime or to produce the world's sole MNT superpower? The first goal is highly desirable, but the second is unlikely to succeed and could make the United States less, rather than more, secure.

An MMP would be a tremendously difficult undertaking, even compared to the original Manhattan Project. Although the United States is arguably the current leader in overall nanotechnology (NT) research, some government and private programs outside the United States are leaders in their respective NT fields. Now consider that the research paths to produce practical MNT are unknown and almost certainly numerous. To assure MNT dominance, our MMP would thus have to dominate every likely research path, including currently unanticipated ones—a very expensive, unfocused, and therefore almost certainly doomed venture. Furthermore, attempts to hire or coerce expertise from non-US programs will likely alienate other nations and spur competition. The MNT Cold War would be on, and unlike the Cold War that defeated the Soviet Union, an MNT Cold War would have to contend with potentially dozens or hundreds of nonstate actors who could upset the strategic balance.

But assume that we "win." Unless we are willing to preemptively destroy the capabilities of our competitors, they will also reach the finish line. Since developing defenses against MNT-based weapons appears more difficult than creating the weapons themselves, we still won't be "safe" from less-advanced competitors, including nonstate actors. Thus, even a successful noncooperative approach lands us in the same situation as an international effort, only without the buy-in from other nations, making monitoring and controlling MNT that much harder. If we are to launch an MMP, developing a workable, enforceable MNT regulatory structure would be its worthiest goal.

I am also indebted to Mr. Tihamer Toth-Fejel for kindly pointing out that Dr. Eric Drexler was not, as I state in my article, the first person to coin the term *nanotechnology*. Prof. Norio Taniguchi of Tokyo Science University used it in his 1974 paper "On the Basic Concept of 'Nano-Technology.'" (See *Wikipedia: The Free Encyclopedia*, s.v. "Norio Taniguchi," http://en.wikipedia.org/wiki/Norio_Taniguchi.)

LCDR Thomas D. Vandermolen, USN
Yokosuka Naval Base, Japan

WHY RED FLAG IS OBSOLETE

I commend Lt Col Rob Spalding on his cogent and germane remarks in "Why Red Flag Is Obsolete" (Fall 2006), but his analysis stops just short of a third and vital scenario: preengagement of main battle forces. Shaping the battlespace is a catchphrase that many use but few truly understand. Joint doctrine addresses shaping the battlespace, yet previous tabletop and field exercises tended to neglect both the battlespace shaping and poststabilization phases. To win a war, we must shape the battlespace upon entry and exit, but battlespace shaping for departure is always subject to unintended consequences.

The two scenarios suggested by Colonel Spalding are useful for fully engaged air and space campaigns. But we don't start that way in the global war on terrorism's battlespace.

In fact, as Spalding mentions, the military is economically constrained. Therefore, being good stewards of taxpayer dollars, we should seek to make best use of what is already in place. And aviation counterinsurgency is a combat-advisory mission that leverages best use of available host-nation air forces in the conduct of an internal or regional engagement. This is a mission legislated to special operations forces (SOF) under the Goldwater-Nichols Department of Defense Reorganization Act.

It has been my personal experience that main forces have a limited or even misinformed understanding of SOF personnel and their capabilities. Although SOF operates throughout all phases of combat operations, these forces are the initial battlespace shapers. For this reason, I propose to add a third scenario to enrich the combat reality sought by Colonel Spalding. This scenario would work to

1. develop understanding of needs, capabilities, and limitations between the phase-one SOF advisory forces and the phase-two main battle forces for campaign and tactical-level planners and leaders;

2. develop understanding of capabilities and limitations of the Air Force's new foreign area officers for main battle-force campaign-level planners; and

3. develop an understanding of how the SOF combat-aviation advisors enhance the best use of available aircraft-to-mission matching using existing host-nation airpower, and learn how to leverage this force into the air tasking order.

Kudos to Colonel Spalding for proposing to update Red Flag with twenty-first-century reality! Whether riding Northern Alliance horses, squaring off in M1A1 main battle tanks, or flying F-15E Strike Eagles, military power will always face the challenge of remaining appropriate, adaptive, and relevant.

Maj David C. Hook, USAF, Retired
San Antonio, Texas

CLAUSEWITZ AND THE FALKLAND ISLANDS AIR WAR

Thanks to Maj Rodolfo Pereyra for his illuminating article "Clausewitz and the Falkland Islands Air War" (Fall 2006). Although I found most of his contentions valid and logical, I failed to discern the Clausewitzian belief in the linkage between politics and war. The author's contention that the Clausewitzian definition can be applied for both countries in the Falklands War could be viewed from another perspective—particularly in the case of Argentina. The fact that the Argentinean military leadership resorted to war to "cover up economic difficulties" (112) strengthens the point that the instrument of war was abused in this case.

Indeed, the relationship between war and politics is not as axiomatic as the fact that two and two make four. Clausewitz's deductions about war being subservient to politics were the product of rational thinking and intense human experience as opposed to the surrealistic mode demonstrated by Argentinean general Galtieri in the Falklands War. Arguably, the instrument of war was abused (by Argentina), in this case as an end for which it was probably unsuited. Moreover, politics was tailored to rationalize the war. In other words, war preceded the politics. Such irrational or subrational reasoning for waging war runs contrary to the Clausewitzian understanding of war in a true sense because it was used to rationalize the irrational. Clausewitz also warned about such possibilities of abusing the use of the military. Indeed, he asserted that "policy is the guiding intelligence and war only the instrument, not vice versa. No other possibility exists, then, than to subordinate the military point of view to the political" (*On War*, rev. ed., ed. and trans. Michael Howard and Peter Paret [Princeton, NJ: Princeton University Press, 1984], 607).

Nevertheless, the increasing attraction towards war as an end rather than a means (which I think is more appropriate in this case) is best explained by Martin van Creveld, who stated in his book *The Transformation of War* (New York: Free Press, 1991) that "war, far

from being merely a means, has very often been considered an end—a highly attractive activity for which no other can provide an adequate substitute" (218). The Argentinean action is probably closer to van Creveld's conception of war than to Clausewitz's. Once again, thanks to Major Pereyra for an intriguing article.

Wing Cdr Z. I. Khan, Bangladesh Air Force
Dhaka, Bangladesh

MYTH OF THE TACTICAL SATELLITE

I wholeheartedly congratulate Lt Col Edward B. Tomme, USAF, retired, for his article "The Myth of the Tactical Satellite" (Summer 2006). I have spent a career in the military-launch business, which has been and is now spending significant dollars to develop the "responsive launch" capability for these mythical "tactical" satellites. One thing that seems lost on many people is the cost of the infrastructure to support rapid launch. Even inexpensive boosters cause launchpad damage that must be repaired, and they require trained crews that must be there and ready for unplanned launches. All the boosters and satellites must be prepurchased and maintained in storage in a flight condition. It can't be done with military crews as there is neither career growth nor continuous activity to maintain training. Thus, we pay contractors. This capability will cost hundreds of millions of dollars to preposition, and it might take weeks to launch a constellation of six to 10 satellites. And what would happen if one of the boosters or satellites failed during the constellation deployment? Until we develop a true tactical capability, our tactical-satellite demonstrations test strategic-augmentation systems that can be deployed as secondary payloads on other strategic missions or use current small boosters like Pegasus, Athena, and so forth.

Col Michael T. Baker, USAF, Retired
Redondo Beach, California

Airmen provide America with air, space, and cyberspace dominance—the first and essential enduring requirement of a successful military operation.

—Hon. Michael W. Wynne, Secretary of the Air Force

Lt Col Paul D. Berg, USAF, Chief, Professional Journals

Developing Airmen

Educating and Training Leaders

ACCORDING TO AIR Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, "the Air Force's fundamental service to the Nation is to develop, train, sustain, and integrate the elements of air and space power to execute its functions across the spectrum of operations" (73). The document enumerates three "core competencies" that lie "at the forefront of the Air Force's strategic perspective and therefore at the heart of the Service's contribution to our Nation's total military capabilities and strategic vision," the first of which is "Developing Airmen" (73). AFDD 1 explains that because Air Force people represent the "ultimate source of combat capability," the service has "dedicated [itself] to ensuring they receive the education, training, and professional development necessary to provide a quality edge second to none" by means of a "career-long focus on the development of professional airmen" (74).

A top Air Force priority, developing Airmen is a complex and time-consuming task. Professional Airmen require a flexible balance between broad education, which teaches them how to think in creative, theoretical terms, and specific training, which teaches them how to perform practical tasks. An improper balance between education and training might degrade combat performance, but the proper balance varies during the course of a career and between different career fields. Early in a career, technical training could well predominate, but Airmen might later need more education to prepare for the strategic-level responsibilities of higher ranks. Engineers, pilots, and public-affairs officers clearly require different blends of education and training. Furthermore, the effectiveness of training lends itself to measurement more easily than does the efficacy of education. For example, one can readily determine if maintenance technicians are properly trained in aircraft repair, but how should one assess their educational development? We must continually develop our people during their careers, even though the precious time spent on education and training remains unavailable for fighting wars.

Ultimately, developing Airmen means growing leaders. Successful Air Force leadership requires a harmonious blend of theoretical and practical knowledge about diverse topics. The service's emphasis on studying foreign languages and cultures adds another facet to Airman development. Even more developmental demands flow from the Air Force's expanding involvement in the cyberspace domain. We must maintain our traditional technical expertise in air and space as well as our insights into leading Airmen while we prepare people for these new fields. We do need technical specialists, but properly educated leaders who can synthesize and guide others in implementing creative solutions to complex, multidisciplinary problems are far more valuable.

The successful development of tomorrow's Air Force leaders demands a long-term commitment and the expenditure of vast resources. Because the free exchange of ideas helps educate Airmen, *Air and Space Power Journal*, the professional journal of our service, dedicates this issue to advancing the professional dialogue about how best to develop Airmen who are ready to lead tomorrow's Air Force. ❑

The Merge

In air combat, "the merge" occurs when opposing aircraft meet and pass each other. Then they usually "mix it up." In a similar spirit, Air and Space Power Journal*'s "Merge" articles present contending ideas. Readers can draw their own conclusions or join the intellectual battlespace. Please send comments to aspj@maxwell.af.mil.*

Editor's Note: For a reply to this article, see "Tactical Satellites: It's Not 'Can We?' but 'Should We?'" by Lt Col Edward B. "Mel" Tomme, USAF, retired, in this issue.

Tactical Satellites

The Rest of the Story

LTC Bob Guerriero, USA*

RETIRED AIR FORCE lieutenant colonel Edward Tomme's interesting article "The Myth of the Tactical Satellite" (Summer 2006) outlines some of the challenges associated with employing a satellite in a tactical role. The author does an excellent job of describing the physical constraints of satellite operations due to orbital mechanics and payload size, weight, and power issues. However, the article includes some inaccurate assumptions about the nature of tactical operations and the potential value of a tactical satellite for the war fighter on the ground, thus leading to a wrong conclusion.

Colonel Tomme begins his article by discussing what the term *tactical* means to a war fighter: "The warrior has a very specific understanding of what that technical term [*tactical*] means—applying to small-scale, short-lived events, usually involving troops in contact."[1] From an Army perspective, *tactical* does have a specific meaning, but it is not limited to Colonel Tomme's. Army Field Manual (FM) 3-90, *Tactics*, states that "the *tactical level of war* is the level of war at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces" (emphasis in original).[2] FM 3-0, *Operations*, defines a *battle* as "a set of related engagements that last longer and involve larger forces than an engagement" and an *engagement* as "a small tactical conflict between opposing maneuver forces, usually conducted at brigade level and below."[3] Colonel Tomme's article implies that all tactical operations are engagements, lasting minutes or hours. In reality, they can last for days, weeks, months, or longer. The planning in advance of such operations can take equally as long.

Any discussion of tactical satellites must also consider the *operational level of war*, defined by FM 3-0 as "the level at which campaigns and major operations are conducted and sustained to accomplish strategic objectives within theaters."[4] A tactical satellite might prove most useful at this level. Because operations can last anywhere from days to years, a theater commander could find the data and support provided by a tactical satellite extremely valuable. At the operational level of war, the commander faces the challenge of linking the tactical employment of units to the fulfillment

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of strategic objectives. To succeed, he or she must leverage both strategic and tactical capabilities, including satellite assets.

Colonel Tomme's article also leaves the reader with the impression of tactical satellites as a replacement for existing constellations of satellites: "A tactical war fighter needs persistent imagery. Getting a snapshot every hour or so is not very useful at the tactical level. . . . It is almost inconceivable to contemplate sending commanders into combat after telling them that they would only be able to communicate five minutes out of every half hour."[5] Finally, when referring to the mission of the Defense Support Program (DSP), Colonel Tomme remarks that "it would still take between 12 and 20 of them to provide continual global coverage."[6] Because these statements tend to narrow the focus to tactical satellites alone, as if they are the only assets available to the war fighter, they inaccurately convey the idea that these satellites fail to meet war-fighter needs. In reality, commanders have a myriad of capabilities available, each suited to a particular application, and tactical satellites could complement these other capabilities.

Tactical war fighters do need persistent imagery, but they neither expect nor require that it come from a tactical low Earth orbit (LEO) satellite alone. A commander relies on the collective ability of ground-based, fixed-wing, and space-based collectors to provide persistence across the spectrum. A tactical satellite that complements other intelligence, surveillance, and reconnaissance (ISR) platforms by providing some specific pieces of information, even just once per day, could be extremely valuable to a commander. Similarly, no commander expects a LEO satellite to serve as a primary means of tactical communications. Many other systems serve this function, but a tactical satellite could augment these systems by providing some specialized, intermittent communications and data access. Finally, no one considers tactical satellites a replacement for the entire DSP constellation, with its global missile-warning mission. Instead, a tactical satellite could complement this constellation by offering an enhanced battlespace-characterization capability. The DSP performs this function now with its overhead nonimaging infrared sensors, but missile warning naturally takes precedence over battlespace characterization, thereby limiting the DSP's utility in that role.

Finally, Colonel Tomme questions the value of any tactical satellite to a tactical war fighter, maintaining that ISR missions are not practical because "the gap times are much longer than the timescale of a tactical engagement."[7] He also argues that "sparse constellations of satellites in LEO have no chance of providing a useful communications capability."[8] In fact, tactical satellites in LEO or high-Earth orbits could perform many extremely valuable missions for theater commanders.

An imagery intelligence or signals intelligence (SIGINT) payload on a tactical satellite, directly downlinked to the theater and available for dynamic retasking by the theater collection manager, could make great contributions by supplementing other resources available to the commander. The advantage of the tactical satellite lies in its responsiveness to the theater commander, who could receive direct support from a space-based asset. One of the most valuable capabilities of space-based ISR platforms remains the ability to collect information over denied territory without an adversary's knowledge. The best use of such a tactical system would entail collecting intelligence over an area selected as the location of an imminent operation, when that area is either denied territory or one that the commander does not want to draw attention to. Even one pass per day could provide useful and actionable information, especially during the monitoring of an area for changes during the days leading up to an operation. Ideally, we would tailor the payload to support operations in a particular theater so that it would provide information not already collected by other sensors. Some examples include a nonimaging spectrometer that could detect the manufacture of weapons of mass destruction, a microwave SIGINT collector, or an infrared sensor that might have a limited lifespan due to cryogen cooling requirements.

We can also envision valuable communications payloads for tactical satellites—even for

intermittent communications. Take for example a communications package that receives low-probability-of-detection transmissions from covert operators and then relays them through other systems to a theater headquarters. By selecting a LEO asset to do this, we could use a relatively low-power ground transmitter and thus lower the probability of detection. A payload of this type would stay overhead only intermittently, and an operator could send updates just at specific times and for limited durations. For a covert operation lasting days or weeks, requiring only periodic updates to the commander, this arrangement might prove completely sufficient. Including a laser-communications payload on this satellite would substantially increase the amount of data transmitted in a short time. We would never use such a system to provide continuous communications; rather, when needed, it would complement other means of communication available. We could also utilize this type of tactical satellite for long-term tracking of friendly or enemy personnel, vehicles, or equipment. Again, thanks to the low-power requirements for transmitting to a LEO satellite, small transmitters in enemy territory could go undetected for long periods of time and would consume very little power. Granted, this system allows only intermittent monitoring capability, but for long-term tracking of personnel or equipment movement, we do not always require or desire continuous updates.

We should not dismiss the value of tactical satellites. They can fill an important role as complements to other existing constellations and assets while providing a level of responsiveness to theater commanders not available from strategic systems. Realizing the potential of these satellites will require the same level of creativity, determination, and perseverance that has made our strategic constellations so successful for over 40 years. ❑

Colorado Springs, Colorado

Notes

1. Lt Col Edward B. Tomme, "The Myth of the Tactical Satellite," *Air and Space Power Journal* 20, no. 2 (Summer 2006): 90, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/sum06/sum06.pdf.
2. Field Manual (FM) 3-90, *Tactics*, July 2001, par. 1-4, http://www.dtic.mil/doctrine/jel/service_pubs/fm3_90a.pdf.
3. FM 3-0, *Operations*, June 2001, par. 2-12, http://www.dtic.mil/doctrine/jel/service_pubs/fm3_0a.pdf.
4. Ibid., par. 2-5.
5. Tomme, "Myth of the Tactical Satellite," 92.
6. Ibid., 95.
7. Ibid., 96.
8. Ibid.

We will begin the crucial part of preparing Airmen for combat operations by increasing the emphasis on combat skills training during our basic military training courses, and we will reorient our continuing education training programs to emphasize language and culture.

—Air Force Strategic Plan, 2006–2008

Tactical Satellites

It's Not "Can We?" but "Should We?"

Lt Col Edward B. "Mel" Tomme, USAF, Retired*

THE ARGUMENT BY LTC Bob Guerriero in favor of tactical satellites, which appears in this issue, is one of the few attempts I have seen at a rational rather than an emotional rebuttal to the arguments presented in my article "The Myth of the Tactical Satellite" and the in-depth study from which that article was derived.[1] I appreciate the thought that went into his rebuttal; however, he appears to have missed the point of those works. In neither piece did I claim that conducting such missions as communications, imagery collection, signals intelligence (SIGINT), or blue-force tracking was impossible using so-called tactical satellites. In fact, I devoted a large portion of those works to showing exactly how effectively we could perform those missions from space. What I claimed was that using tactical satellites to perform those missions was highly impractical when constrained by a limited budget. The point of that detailed research was to give senior decision makers a tool with which to measure the actual opportunity cost of such an endeavor.

According to Colonel Guerriero, "A tactical satellite that complements other intelligence, surveillance, and reconnaissance (ISR) platforms by providing some specific pieces of information, even just once per day, could be extremely valuable to a commander."[2] The unstated corollary to his assertion suggests that such a capability will also cost money—money that we could use elsewhere. Undoubtedly, commanders on the ground would rarely turn down an additional satellite photo of their area of responsibility. Having a gap-filling capability to compensate for the weaknesses of other assets would also be a plus. However, before commanders sign up to own that capability, they should know the opportunity cost of getting that image and weigh it against their tactically sized budgets. In a vast majority of tactical situations, some other means of obtaining that photo exist—means that are responsive to the tactical commander instead of being slaves to orbital mechanics. Those means are almost invariably much more affordable, much less predictable to opposing forces, and thus much more effective. When such means are available, the rationale for going to space to get that photo seems counterproductive. It's not that those missions *can't* be done from space; it's that in most cases, they *shouldn't* be done from space. The opportunity costs are huge. The money that commanders would need to spend to buy a single satellite to produce that one picture per day could buy quite a bit of alternative equipment, including nonorbital systems that would likely prove more effective since they don't spend most of their time halfway around the globe.

Space-based assets have two things in their favor that in many cases mitigate their expense: freedom of overflight and relative immunity to threats of physical destruction.† The big operational drawbacks to satellites are excessive predictability and extremely limited persistence. Those combinations of factors tend to make satellites very useful in the strategic role. In contrast, tactical areas of interest are almost always significantly less than global, in most cases well within the footprints of nonorbital

*Colonel Tomme's final Air Force assignment in 2006 was as deputy director, Air Force Tactical Exploitation of National Capabilities (TENCAP), where he directed programs designed to extract tactical effects from strategic overhead assets.

†The recent Chinese antisatellite launch considerably dilutes this advantage.

assets. Colonel Guerriero states that "tactical operations . . . can last for days, weeks, months, or longer,"[3] implying that individual engagements and battles between small maneuver forces can be linked in time and space to form a single tactical operation.* It is a near truism that all military activity involving troops in contact does occur at the tactical level. It is also fairly clear that when a series of battles or engagements starts to last "days, weeks, months, or longer," the level of control should shift up to the operational or strategic levels of war. It seems obvious that the longer an operation lasts, even though, in truth, it consists of a series of related tactical events, the further up the spectrum of war it must progress. Without such a progression of command attention, the rationale for having higher levels of command would not exist. Regardless of personal interpretations of Army doctrine, operations lasting for significant periods and/or extending across substantial spatial extents would appear to warrant the attention of higher-level command, and hence should be classified collectively as something other than tactical operations.

Why is the definition of the level of war so germane to the problem of the so-called tactical satellite? It all boils down to *truth in advertising*. Advertising is how any product goes after customers and, ultimately, funding. Selection of the name *tactical satellite* appears to have its basis in sex appeal; the term sells the concept to an acquisitions staff desperately looking for ways to enhance delivery of command, control, communications, computers, intelligence, surveillance, and reconnaissance effects to the lowest level of war fighter whose inability to receive those effects adequately during Operation Iraqi Freedom has been well documented.[4] Who could refuse to buy a program that promises to deliver tactically controlled space effects directly to the front lines at an ostensibly affordable price? Unfortunately, the deliverable effects publicly touted as the raison d'être for funding a tactical-satellite program, apparently designed to gain maximum attention from potential funding sources, appear unachievable within a constrained budget.

The marketing campaign related to tactical satellites is uniform in its message of direct tactical support. For example, the Air Force Space Battlelab and the Army Space and Missile Defense Battle Lab demonstrated the innovative Virtual Mission Operations Center (VMOC), a program designed to allow control of tactical satellites from the field, to Air Force Space Command commanders. That demonstration touted the use of untrained enlisted personnel in a simulated field environment outside of the Fourteenth Air Force headquarters building to show the system's capability to give a tactical soldier the ability to direct satellite collections and access the products in real time. The obvious implication of this demonstration was to show that the capability would be pushed out into the foxholes where even the lowest-level soldier could task orbital assets and immediately use the space data he or she had requested. Article after article in the press stressed directly taskable support to warriors in the field with statements such as "We believe we will give the soldier on the ground the ability to control a spacecraft payload," "Today's technology is close to giving a foot soldier and the tactical warfighter the kind of space capabilities needed," and "[This capability will] directly benefit the troop on the ground."[5] Briefings by senior officials in the Air Force Research Laboratory (AFRL) heightened anticipation among senior Air Force leadership of direct tactical tasking and support from space.[6] An article on TacSat-3 in the *Air Force Times* even bore the headline "Satellite in Works to Beam Battlefield Pictures to Troops." That article went on to say, "When the Air Force began beaming pictures of the battle space from airplanes to small units of ground troops, it was a breakthrough. Now, the Air Force Research Laboratory is looking at doing the same with pictures from satellites. . . . The key to the experiments is to show a satellite can fly over the theater and that a soldier on the ground can directly task the satellite and

*Extending this assertion to its logical but absurd conclusion, one could consider all of World War II a single tactical engagement.

get information."[7] Without question, the marketing thrust is geared toward the idea that tactical satellites will provide direct support to tactical war fighters.

The problem with this coordinated marketing campaign relates to the need for truth in advertising, discussed above. In all likelihood, the effects tantalizingly advertised by tactical-satellite advocates will not find their way to the front lines at all. As shown in "The Myth of the Tactical Satellite," the least expensive tactical satellite used for imagery will cost a commander about $500,000 per hour overhead in acquisition costs alone and will provide only a stroboscopic glimpse of the battlefield, less than two minutes out of every five hours or so. Furthermore, per-hour cost isn't the only issue. Many years prior to actual need, senior leaders will have to make decisions concerning which missions may require augmentation; planners must program resources to develop and acquire the necessary single-purpose satellites and launch vehicles; and all this investment must then go into suspended animation for an undetermined period of time to await an unspecified tactical need in an unknown geographical area.

Those acquisitions and logistical costs add up quickly, but prioritization of access to the asset during the limited time it is overhead will be an even more pressing problem. It is naïve to believe that such prioritization will occur at less than the operational level of command, if not higher. Colonel Guerriero as much as admits this point himself when he describes the operational level as the one at which "a tactical satellite might prove most useful."[8] Additionally, anyone who has worked with imagery or SIGINT knows that substantial analysis goes on before publication of any product because the raw data is difficult for amateurs to interpret. Getting these products to the field would not be as simple as picking up developed photos from Wal-Mart. It is highly doubtful that the fabled sergeant in the foxhole directing a satellite to give him an image of the enemy over the next hill will ever exist, given the current physical and fiscal constraints on tactical satellites. Even if he does not personally direct the sensor, the odds that his need to obtain one of the very few images captured during a pass will rise to the top of the queue seem very low, considering the numerous, simultaneous tactical engagements likely to be in progress at the time. The resources are just too precious.

One could certainly move a family's household goods across the country with a fleet of Ferraris that one had to buy specifically for that job and then garage them for an indefinite period before the family even had orders to move. Obviously, however, a number of more operationally and fiscally responsible paths to the desired end state exist. Our goal should not be to go to space just because we can.

In conclusion, we must definitely look to space when it offers the most effective way to accomplish the mission. Without a doubt, a mission requiring global coverage or even overflight of denied territory beyond the range of airborne or near-space sensors plays to the strength of space. We could even envision missions in which receiving information exfiltrated from Colonel Guerriero's small covert-operations team is important enough to warrant launching an asset costing several tens of millions of dollars. However in the vast majority of realistic situations, given the existence of so many more effective ways to support our tactical warriors during the relatively short timescales and across the relatively small areas in which they operate, it appears that promoting the theory of "space because we can" is an unaffordable, unresponsive, ineffective, and ill-advised course of action. ❑

Colorado Springs, Colorado

Notes

1. Lt Col Edward B. Tomme, "The Myth of the Tactical Satellite," *Air and Space Power Journal* 20, no. 2 (Summer 2006): 89–100, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/sum06/sum06.pdf; and idem, *The Strategic Nature of the Tactical Satellite*, Research Paper 2006-1 (Maxwell AFB, AL: Airpower Research Institute, College of Aerospace Doctrine, Research and Education, n.d.), https://research.maxwell.af.mil/papers/ay2006/CADRE/tomme.pdf (accessed 31 January 2007).

2. LTC Bob Guerriero, "Tactical Satellites: The Rest of the Story," *Air and Space Power Journal* 21, no. 2 (Summer 2007): 28.

3. Ibid., 27.

4. Lt Col Edward B. Tomme, *The Paradigm Shift to Effects-Based Space: Near-Space as a Combat Space Effects Enabler*, Research Paper 2005-01 (Maxwell AFB, AL: Airpower Research Institute, College of Aerospace Doctrine, Research and Education, n.d.), https://research.maxwell.af.mil/papers/ay2005/ari/CADRE_ARI_2005-01.pdf (accessed 17 January 2007).

5. Patrick Chisolm, "Micro-Eyes in Space," *Military Geospatial Technology* 4, no. 3 (14 July 2006), http://www.military-geospatial-technology.com/article.cfm?DocID=1547 (quotation attributed to Peter Wegner, the AFRL responsive-space lead) (accessed 12 December 2006); Maryann Lawlor, "TacSat Delay Ignites Frustration," *Signal Connections* 3, no. 9 (15 June 2006), http://www.afcea.org/signal/articles/templates/SIGNAL_Article_Template.asp?articleid=1154&zoneid=188 (quotation attributed to Peter Wegner) (accessed 2 February 2007); and Michael Kleiman, "Responsive Space Demonstrator Ready to Roll," Air Force Print News, 5 November 2006, http://www.af.mil/news/story.asp?storyID=123030853 (quotation attributed to Neal Peck, TacSat-2 program manager) (accessed 12 December 2006).

6. AFRL briefing, Dr. David Hardy, "TacSat Demo Status: Senior Leader Vector Check," Washington, DC, 22 September 2004; and AFRL briefing, Col Rex Kiziah, "Joint Warfighting Space," Schriever III War Game, Nellis AFB, NV, 8 February 2005.

7. Bruce Rolfsen, "Satellite in Works to Beam Battlefield Pictures to Troops," *Air Force Times*, 13 November 2006, http://www.airforcetimes.com/legacy/new/0-AIRPAPER-2320736.php.

8. Guerriero, "Tactical Satellites," 27.

More than ever, we depend on our allied Airmen to succeed, and they depend on us. We must fly and fight as one. We teach, we partner, we learn—and in building friendships, we build trust. America's security today and in the future depends on building successful international partnerships, one Airman at a time.

—Hon. Michael W. Wynne, Secretary of the Air Force

The Inadvisability of Posthumously Promoting Billy Mitchell

Col Phillip S. Meilinger, USAF, Retired*

I TEND TO AGREE with Lt Col William J. Ott's argument in a previous issue of this journal regarding the inadvisability of posthumously promoting Billy Mitchell ("Maj Gen William 'Billy' Mitchell: A Pyrrhic Promotion," Winter 2006). Here's my own read on the matter.

Yes, Billy Mitchell was a great Airman—a visionary who saw a future for airpower that far transcended its use as a mere adjunct to surface forces. In the current era of "military transformation," those in uniform, of all ranks, are encouraged to "think outside the box"—not simply to devise improved methods of doing old things better and more effectively, but to imagine totally new methods, doctrines, and concepts of fighting and winning wars. Mitchell's belief in airpower's ability to transform war was perhaps his greatest achievement. He passionately believed that airpower offered a new way to fight. Having seen the trench carnage of World War I, he looked for a better way. Strategic airpower offered a totally different path to victory. Though Mitchell's vision was imprecise—often the case with prophets—his fundamental understanding of airpower's transformational possibilities, as well as his ability to inspire a host of other Airmen to share that vision, marks him as a seminal and heroic thinker.

Billy Mitchell was indeed a great Airman. But should we promote him now, so many years after his death? In my view, only two reasons justify contemplating such a move: (1) because of continuing service to his country and significant achievements not previously recognized, or (2) because of a need to redress gross and obvious injustice.

This sort of rationale has previously played a part in promoting men long after they left the service. For example, in 1985 Jimmy Doolittle and Ira Eaker became full generals 40 years after their retirement. Not only had they performed magnificently in World War II, for which they were justly rewarded with three-star rank, but they had also continued to serve their country afterwards by becoming spokesmen for airpower—by serving on various commissions and panels, working in the air and space industry to advance the technical boundaries of those mediums, and displaying a seemingly never-ending willingness to talk to men and women of all ranks regarding the wonders of the air. As a junior Air Force officer, I heard both men speak and found them inspirational.

On the other hand, we must balance such criteria against the possible negative effects felt by others in uniform. In the case of the two men noted above, I heard two other senior Airmen—both full generals long retired—express dismay at the promotions of their old colleagues. They were not being petty but simply stating what seemed to them a simple fact: Doolittle and Eaker had retired at an early age to enter business and earn substantially more money than they ever could have made in uniform. That was their reward. To promote them retroactively would slight the toil of all the people who stuck with their service during lean times in the aftermath of war.

It is useful to remember here that the military has always taken the position that it does not consider promotion a reward for past actions—that's what medals and decorations are for—but as a sign of the promise and poten-

*The author is retired from Northrop Grumman and living in West Chicago, Illinois.

tial that an individual possesses for future tasks. In the case of Billy Mitchell, he contributed relatively little after leaving the Air Corps in 1926. He lived for another decade, but in truth, he became largely a forgotten figure, seldom called upon by his country or his service. His one book, *Skyways: A Book on Modern Aeronautics*, merely rehashed old ideas previously published.

As for the case of using a delayed promotion to right an obvious injustice, we must be careful. Did the military or its justice system truly abuse the individual, or is the proposed promotion merely an attempt to soften a decision in today's kinder and gentler world? If the latter, then the concern is misplaced. The military justice system, with its necessary emphasis on duty and responsibility, must be upheld. In the military, whose members' lives depend upon the decisions made by a commander, it is most unwise to undermine or soften a system in which the consequences of failure are so high. The buck really does stop here for the military commander.

In the case of Billy Mitchell, we must ask if his court-martial in 1925 for insubordination was an unjust act. No credible evidence supports that conclusion. Mitchell did in fact accuse his superiors in the Army as well as senior admirals in the Navy of "incompetency, criminal negligence and almost treasonable administration of the national defense"—very harsh words for a group of men who had served their country for decades and who had seen combat themselves, on several occasions.[1] At his court-martial, Mitchell's attorney stated that every American had a constitutional right to express his or her opinion. This is pure rubbish. Military officers must abide by different rules; they must follow orders and exercise self-discipline. As for his charges of incompetence and malfeasance within the service hierarchies regarding the state of aviation at the time, the truth tends to remain largely in the eye of the beholder. All of the branches complained of fiscal strictures, and all feared that they did not have the resources to do their jobs adequately.

Regardless, after reading through the transcript of the court-martial, one must conclude that Mitchell quite simply did not know what he was talking about regarding the status of naval aviation—and recall that his charges were made as a specific result of the crash of the US Navy dirigible *Shenandoah*—or even that of his own service. Indeed, his performance on the stand was an embarrassment. The court, composed of 10 general officers, found him guilty, and his punishment—suspension from rank and duty for five years and forfeiture of all pay and allowances during that time—was reasonable. The prosecutor had called for dismissal from the Army and hinted at prison time. Instead the court handed down a lenient sentence, taking into consideration Mitchell's combat record in the war. Pres. Calvin Coolidge lightened the sentence even further, granting him half pay for those five years. But Mitchell elected to resign. After the Air Force became independent in 1947, it attempted to reopen the court-martial, hoping to reverse its findings. After review, however, service leaders concluded that Mitchell was indeed guilty as charged.

Then there is the matter of Mitchell's private life. Forget that he virtually deserted the children of his first marriage, philandered, and had drinking problems. The recent revelation—discovered in dusty inspector-general files long forgotten and brought to light by Douglas Waller in *A Question of Loyalty*, his biography of Mitchell—of a domestic incident between Mitchell and his first wife staggers the imagination. The file tells of military police arriving at the Mitchell quarters after Mrs. Mitchell had suffered a gunshot wound in the chest during an altercation with her husband. She claimed that he shot her in a drunken rage; he claimed that she shot herself in a drunken stupor. No one witnessed the event. Fortunately, the wound was not serious, but they divorced soon after. Even in a modern age that tends to overlook personal immorality as long as it doesn't affect job performance, this behavior is a bit much. Is this the role model we wish to honor?

In sum, Billy Mitchell was a great Airman who served his country well in war and peace. He was rewarded for that service—in 1941 Congress even struck a special gold medal in

his honor. But Mitchell also had deep flaws that affected his performance as an officer, a commander, and a man. We must not forget this fact when we consider the issue of promotion so long after his death. ❑

West Chicago, Illinois

Note

1. "Statement of William Mitchell Concerning the Recent Air Accidents" (statement to the press, San Antonio, TX, 5 September 1925), 1, http://www.afa.org/magazine/july2006/keep_billy.pdf.

Editor's Note: PIREP *is aviation shorthand for* pilot report. *It's a means for one pilot to pass on current, potentially useful information to other pilots. In the same fashion, we use this department to let readers know about items of interest.*

Leading from the Front, Rear, and Center

A Squadron Commander's Approach

Lt Col Christopher T. Daniels, USAF*

EFFECTIVE LEADERSHIP encompasses various styles and approaches. Experience I have gained not only as a commander but also as a follower has shown me that the best leaders use a multidimensional approach to evaluating the many aspects of a given situation. This becomes necessary in order to draw from the right set of assumptions and make an informed decision. A leader can give no greater gift to our Air Force than treating his or her followers fairly and accountably, thereby creating a healthy environment, both at work and at home. My leadership approach, which I refer to in this article as front-rear-center (FRC, pronounced "frock"), applies the concept of "frocking"—a military term used for an officer who receives a field promotion to the next higher grade. Frocking seeks to meet mission demands. My objectives called for elevating my squadron, based on its past achievements; supporting professional goals; and building on the unit's established set of core values, all of which would help us through transformational efforts.

During my teenage years, my mother and father would sometimes return home from work not in the best of moods. I always wondered what kind of boss would send them back to their family that way. Did their bosses not respect their roles as parents, nurturers, and models for their son, in addition to their status as employees? Did they really care for or appreciate them? Whenever possible, as a commander, I tried to avoid sending folks home to their families carrying unnecessary stress and burdens.

On my first day of command, I set my vision into motion by clearly defining expectations, realizing, however, that this vision had to be realistic and attainable for the people buying into it. Early on, this gave the squadron an idea of what mattered during the developing

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and shaping of the organization's constitution. This commitment tooled and geared the unit into motion, driving it to many victories. For example, our unit climate-assessment grade of 100 percent indicated that our teamwork had reached an all-time high; furthermore, squadron leadership received a grade of 99 percent. Ultimately, because of the FRC leadership approach and unit commitment, we earned a "fully compliant" rating during the command's unit-compliance inspection.

Commanders must have the competence to lead their organizations. As a contracting-squadron commander, I needed to understand every aspect of the mission for our unit—unique in that it supported the Air Force's largest F-16CJ fighter base and a numbered-air-force headquarters directly involved in conducting wartime operations in Southwest Asia. I had to comprehend completely the nuances of the wing's and numbered air force's mission and vision as they pertained to items as small as a $20 commodity or as large as a $20 million communications system. Transforming our business doctrine didn't require a great deal of thought, but tapping underutilized resources to streamline processes presented a substantial challenge. The expansion of our client base, realignment of flights, and innovative focus on individual goals set unprecedented benchmarks. The squadron recorded the highest dollar-obligation rates ever, climbing from number eight to number two in the command within 12 months.

My mentors and technical training prepared me well. People within my career field must be careful to avoid limiting their role and focus only to executing the contract action. As a contracting professional, I underwent many years of training to do just that. However, I confronted the task of finding the mechanism to implant leadership empowerment, professional and personal trust, and sound decision making at all levels. Fortunately, I discovered that mechanism—the FRC approach—and used it to lead and instill confidence.

Leading from the Front: Be Willing to Take the Hits and Pass the Glory

A commander has ultimate responsibility for the success of his or her unit. Success means fulfilling the mission in such a way that members of the unit derive a sense of satisfaction from having done so. Thus, success for the squadron depends wholly on all members' daily actions and interactions with each other, in the unit, and outside the unit with customers, other base organizations, contractors, and senior leadership. How we act and interact with others directly affects our performance results, ability to accomplish the mission, and capacity to gain satisfaction from our work—ultimately, it determines the success of an organization. The following two sections offer examples of how I implemented the FRC leadership style, using excerpts from my annual letter to squadron members to remind them that accomplishment, from top to bottom, requires a team effort.

Leading from the Rear: Push Hard and Uplift

I owe it to each of you to make sure we do the right things so that, collectively, we can achieve excellence in all we do. Therefore, I must ensure

- that you have every opportunity to enhance your professional development through attendance at formal training courses, a robust on-the-job training program, job rotation, and full support of those activities that will maximize promotion potential;

- that appraisals and performance reports are completed on time, accurately and fully reflecting work performed and results achieved during the rating period; and
- that various team-building actions and accomplishments maximize our ability to work together and with personnel outside the squadron.

Success is certainly nothing new to you. I intend to do everything I can to enhance your opportunities for even greater levels of success so that you perform the mission well and gain a real sense of satisfaction in the process. Executing our daily activities using core values as guidance puts us on the right path to reaching this goal.

Leading from the Center: Become the Core

The US Air Force's core values—integrity first, service before self, and excellence in all we do—provide the proper guidance on how we should act and interact with others. They establish the appropriate standards for success, deviation from which will surely result in failure. The following discussion focuses on my vision of how these core values relate to everyday activities—my expectations and, just as importantly, your expectations of me—as we strive together to achieve success as a squadron.

Integrity First

This core value, the basis for trust, connotes the willingness to do what is right. It embodies the indispensable traits of courage, honesty, responsibility, accountability, justice, openness, self-respect, and humility. We should establish integrity as the foundation of all our actions and interactions. Some important ways in which integrity ensures our success include commitment, communication, and equal opportunity and treatment.

Commitment. A commitment involves a promise to perform an act, often by a specified time. We must be careful to make only those commitments we feel confident that we can keep—and then we must dutifully fulfill them. I understand that on occasion we may come to realize that we cannot fulfill a commitment we have made in good faith; if this situation arises, we must immediately communicate this fact to all involved parties and come to a mutual agreement on how best to resolve the situation. We must remain responsible and accountable. Unfulfilled commitments result in distrust and undermine good working relationships. Don't underestimate the beneficial effect of successfully keeping even the smallest of commitments.

Communication. Open, honest, and clear communication is not only integral to making and keeping commitments but also absolutely essential to developing, maintaining, and enhancing our professional relationships. We rely on communication to establish expectations, provide status reports on our progress towards meeting those expectations, and then indicate when we believe we have met them. If expectations are unclear, we need to ask for clarification. Effective communication results from clearly conveying a message and ensuring that the recipient completely understands it. We have an obligation to our senior leadership, customers, and contractors to keep them informed, as well as to ourselves to keep each other informed. And I have an obligation to you to listen and respond to your concerns and suggestions. For this reason, I maintain an open-door policy and strongly encourage you to talk with me at any time. If we can solve a problem or enhance our working processes or environment, let us do it—and let us do it now! Effective communication enables us to learn from our mistakes, develop both professionally and personally, and avoid problems in the future. It also allows us to tell our story so that others can understand our challenges and learn of our accomplishments. In short, communication is the lifeblood necessary for success.

Equal Opportunity and Treatment. I am an aggressive and obsessive advocate of providing equal opportunity to all of you and treating you fairly and consistently—and I expect you to do the same. I will not tolerate discrimination or sexual harassment, and neither should you. Evidence of such behavior should be brought to my attention immediately; tolerating such behavior will undermine good order and discipline as well as impede our path to success.

Service before Self

This core value tells us that professional duties take precedence over personal desires. It encompasses the concepts of rule following, respect for others, discipline and self-control, and faith in the system. It also embodies the importance of teamwork. No member of this squadron is more important than any other, and no individual member can do everything necessary to ensure the unit's success. If we do not internally work together as a team and externally partner with senior leadership, customers, and contractors, we will not fulfill the mission and we will not succeed. Teamwork requires honoring our commitments, effectively communicating, and treating every person as we would want to be treated. In addition, it means looking out for each other to ensure our personal safety and the security of our work environment, caring for our families and involving them in squadron activities, and properly sponsoring new unit members and meeting their needs. Teamwork also means stepping up to the challenge and filling in when we have absences due to illness, leave, temporary duty, or the performance of additional duty.

Excellence in All We Do

Excellence directs us to develop a sustained passion for continuous improvement and innovation that will propel us into a long-term, upward spiral of performance and accomplishment. To achieve the highest levels of excellence, performance, and accomplishment, we must do the following:

- Maintain professional conduct and bearing in all of our daily activities.
- Sustain and enhance our customer focus, always remembering that we are a service organization. Without our customers, the products and services we provide would become irrelevant. However, we must balance our customer-oriented approach with our responsibility to do the job "right" by being good stewards of taxpayers' dollars and by following all applicable policies, regulations, and statutes.
- Take care of our physical and mental well-being by adopting a wellness lifestyle. Therefore, I encourage you to participate in physical-fitness activities.
- Shun drug or alcohol abuse and ensure that we provide appropriate assistance and support to those who need help in this area.
- When possible, maintain and upgrade our working environment. We should take pride in our facility's appearance.
- Continue the formal and informal processes of planning and evaluating to identify those areas in which we can improve, take the steps necessary to implement such improvement, and then measure the results to guarantee that it has in fact occurred.

Conclusion

As outlined above, I try to validate the FRC approach to leadership by strongly emphasizing our core values in order to gauge squadron cohesion and success. In a recent letter to Airmen, Secretary of the Air Force Michael Wynne and Chief of Staff Gen T. Michael Moseley stated,

> As we remember, we must also reaffirm our commitment to our Core Values—Integrity First, Service Before Self, and Excellence in All We Do—which are the bedrock upon which we operate and build our future. We must also resolve to reinvigorate our Air, Space and Cyberspace

> capabilities. So even while we're engaged in the current Long War, we're transforming ourselves into an information age force that will be able to dominate across our domains and have dislocating effects at all levels of war in this relatively new century. We're building on our history and soaring toward our horizon.[1]

As leaders, we must respond to this call to action by sowing and cultivating the Air Force's strategic goals. That will require fortitude and implementation of the FRC concept as we transform our organizations, thus ingraining mission fulfillment and producing amazing results.

As commanders push the limits, we need perspective and advice from the people we lead. I have learned that the FRC-leadership skill set must remain congruent with—as well as capitalize and build upon—the leader's own strengths and talents. Many issues commonly addressed as leadership, learning, or transformational challenges are really an inevitable part of commanding. Indeed, in today's Air Force, without experience in managing difficult situations, no one can sustain effectiveness for very long. The FRC style of leadership development emphasizes the relationship between a leader and the people whom he or she leads. Is the follow-me leadership model appropriate at times? Or is the give-and-take, person-centered model preferable? Well, it depends—on whether members of the organization are committed and willing to follow their leader. I found that my FRC leadership approach, fused with the Air Force's core values, proved quite effective because it created an environment of collaborative assistance capable of solving problems and encouraging development. It thus guaranteed success for individuals, the organization, and leadership. For me, frocking held the key to leading and transforming the squadron, executing its assigned tasks, and honoring the people and their families who unselfishly make sacrifices to fulfill our Air Force's mission. ❑

Note

1. Secretary of the Air Force Michael W. Wynne and Chief of Staff of the Air Force Gen T. Michael Moseley, "SECAF/CSAF Letter to Airmen: Air Force Heritage," 5 October 2006, http://www.af.mil/library/viewpoints/jvp.asp?id=274.

I'm firmly convinced that leaders are not born; they're educated, trained, and made, as in every other profession. To ensure a strong, ready Air Force, we must always remain dedicated to this process.

—Gen Curtis E. LeMay, USAF Chief of Staff, 1961–65

Inventory Management of Officers with Advanced Academic Degrees

The Case for a New Approach

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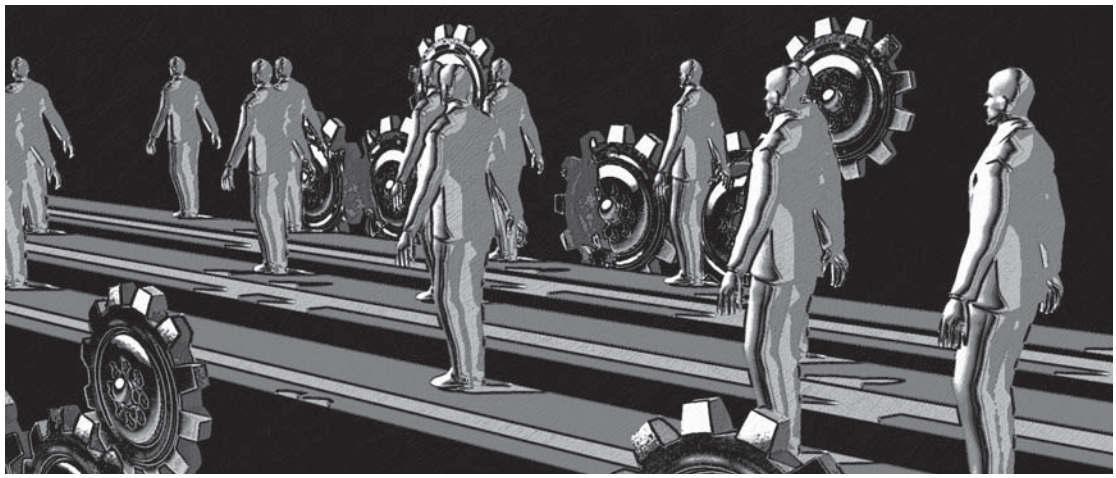
Editorial Abstract: Every year the Air Force fills numerous graduate-level education positions using a decades-old system that seeks to project graduate-education requirements against upcoming advanced academic degree (AAD) billets. The authors propose replacing this requirements-based system with a new model that considers Total Force development and capabilites-based planning. They assert that their model will ultimately demonstrate lifelong educational development for individuals and strategic improvement for the Air Force.



EACH YEAR HUNDREDS of military officers receive advanced academic degrees (AAD), sponsored and funded by the Air Force. Because graduate education is costly in terms of both funding and man-hours, we must take care to ensure the relevance of these degrees to each officer's professional development. However, the existing system that we use to select officers for graduate education does not meet this intent.

The Graduate Education Management System (GEMS), the current "bottom-up" billet-based requirements process, focuses on resource management and utilization rather than

on education, professional development of officers, and health of the career field.[1] Succinctly put, the GEMS does not employ a strategic vision to ensure that the graduate education of officers provides an appropriate set of war-fighting capabilities. Rather, the system is primarily designed to project and fill AAD-coded billets with officers possessing the specified degree and to provide an auditable tracking system for utilizing these officers. This article demonstrates the incompatibility of such an approach with the concepts of Total Force development as well as capabilities-based planning and proposes an alternative—the Advanced Academic Degree Inventory Management (AADIM) model.

Background and Issues

The GEMS generates unit-level AAD requirements, validates and certifies billets, and projects vacancies annually, doing so at the lowest level, where it is ostensibly easiest to identify the need for AAD education. The validated list then goes to the Air Force's career-field monitors, responsible for reviewing, certifying, and prioritizing their functional area's list of AAD billets. They act as points of contact for organizational and unit functional managers as well as for the Air Force Education Requirements Board, which approves educational quotas within available funding levels and places the remaining requirements on a prioritized alternate list. The Air Force Personnel Center advertises the available AAD opportunities and matches approved officers with a graduate-degree program. Selected personnel attend the Air Force Institute of Technology (AFIT) or other graduate institutions to obtain an AAD with a follow-on assignment dictated by the educational discipline. Officers serve a subsequent three-year payback tour in a validated AAD-coded billet, concurrent with a mandatory active duty service commitment.[2] The Air Force intended that the GEMS fulfill the Department of Defense's (DOD) requirement of fully accounting for the utilization of graduate-education resources; this system, along with a stringent validation process, serves as the foundation of the system's billet-based approach.[3]

However, in 1992 an audit by the Air Force Audit Agency found that officers were serving in AAD-coded follow-on assignments an average of one and one-quarter years versus the mandatory three years, and that AAD-coded position incumbency rates were only 40–50 percent.[4] The audit apparently did not consider the fact that officers found themselves at a competitive disadvantage by having to forgo career progression and broadening opportunities to remain in an AAD-coded billet for three years. Such a career risk has acted as a disincentive for officers to pursue fully funded graduate education. Local commanders clearly understood this problem and compensated by reassigning officers at the expense of leaving the AAD billet vacant until the projected arrival of the next AAD officer. To address this systemic problem, the report made the stunning recommendation of cutting the number of graduate students by 58 percent for fiscal years 1995–98.[5] Although in line with resource utilization, this recommendation does not acknowledge an important aspect of an AAD—professional development and career-field health. Today the unchanged GEMS remains the primary process for managing professional graduate education. In fact, the *Report on Air Force Institute of Technology (AFIT): Study for Senate and House Armed Services Committees*, submitted as required by the National Defense Authorization Act of 2001, recommended continuing the present system to manage advanced education.[6]

In November 2002, a "Chief's Sight Picture" called for taking officer development in a new direction, both educationally and professionally.[7] Although initiatives for Total Force development now address assignments, placement in professional military education, and selection of squadron commanders, it still does not cover the critical aspects of professional development related to obtaining specialized graduate education.

The GEMS does not include any consideration of long-term requirements or the aggregate educational health of various Air Force specialty codes (AFSC). Lt Col Raymond Staats

and Maj Derek Abeyta provide a case study with respect to the space-and-missile career field, finding that, over the last 10 years, GEMS processes have significantly contributed to the near-extinction of space-related AAD billets, as well as graduate-level space education within the Air Force officer corps.[8] The Space Commission made clear in its final report that it considered this an unacceptable situation.[9]

The introduction and formulation of Total Force development have restructured how the Air Force conducts education, training, and assignment processes. Air Force Instruction (AFI) 36-2640, *Total Force Development (Active Duty Officer)*, introduced the concept of development teams (DT), whereby each functional career field manages and oversees the professional development of officers, including education, by "providing input into the [developmental education] selection process."[10] The GEMS has neither incorporated DTs into the AAD process nor linked a coherent strategy to AAD selection, career-field health, or professional development. Instead it remains focused on resource management and utilization, bottom-up requirements, and near-term planning by exception. The inherent weaknesses of GEMS processes in the areas of professional development, career-field educational health, the role of DTs in professional education, and strategic planning point to the need for a new approach—as embodied by the AADIM model.

Education as a Strategic Capability

Developing officers with enduring competencies is the key to a strong, responsive, and skilled military force. Similar to offering combatant commanders a range of effects-based capabilities, having educated officers capitalizes on our most flexible, adaptive, and important capability—Airmen. Education is an integral part of officer development and an indispensable ingredient in initiatives concerning Total Force development. In their recent letter to all United States Air Force officers, Secretary of the Air Force Michael Wynne and Chief of Staff of the Air Force Gen T. Michael Moseley stated, "In a smaller, leaner and more expeditionary-focused Air Force, it is essential that our Airmen have the knowledge and competency to accomplish our mission," emphasizing that "one of the most effective ways to develop this knowledge is through advanced education."[11] As the world becomes more complex, globally interconnected, and dependent on rapidly changing technology, not only must our officers possess advanced education but also each career field must have the correct mix of AADs so that commanders have the right personnel for the right situation.

Analysis of current AAD compositions shows that many career fields have officers with an inappropriate range of AAD capabilities. For example, although 99 percent of lieutenant colonels in the space-and-missile career field (AFSC 13S) have AADs, only 13 percent of them are considered technical degrees.[12] As such, the 13S career field lacks critical competencies, thereby necessarily limiting a combatant commander's range of space-and-missile-related capabilities.

The importance of AADs is not unique to the military. A recent Internet-based survey of *Fortune* 500 government-contractor firms found that 83 percent of senior managers have AADs (fig. 1).[13] More importantly, the mix of degrees within these organizations shows a deliberate selection and development process focused on both management and technical competence, designed to complement each company's vital needs. Twenty-eight percent of these executives have technical degrees, and the range of degrees reflects long-term planning to acquire educational expertise. Not only are advanced educational profiles for many Air Force career fields significantly out of balance, but also no mechanism currently exists to correct this problem. It is important to note that the Air Force cannot directly hire senior leadership, as can the corporate arena. We must develop and educate military leadership from within the existing personnel pool—a career-length endeavor that demands strategic foresight and long-range planning.

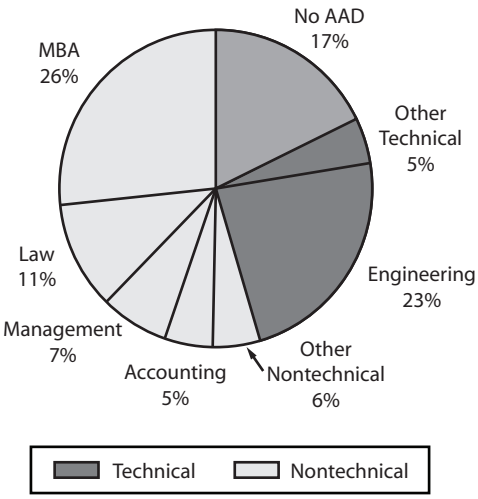


Figure 1. *Fortune* 500 government-contractor advanced-education profile for senior executives

The GEMS makes the fatal mistake of assuming the feasibility of aggregating a Total Force strategy from disjointed field-level inputs. For example, within the current GEMS construct, only 2 percent of 13S career-field billets are marked as validated positions requiring technical education.[14] The AADIM model, in contrast, offers a capabilities-based strategic approach that can implement initiatives and direction for Total Force development.

The Advanced Academic Degree Inventory Management Construct

AADIM seeks to give career fields a flexible and responsive approach to overseeing professional development and educational health through "top-down" AAD management. It emphasizes selection and career-field management rather than tracking and resource utilization. A capability (inventory)-based system, AADIM focuses on deliberate strategic requirements instead of narrowly and often arbitrarily selected billets.

The force-development management structure established by AFI 36-2640 encompasses all of the organizations vital to the AADIM approach (fig. 2). By expanding its oversight into AADs, the Force Development Council (FDC) can establish an AAD Total Force strategy as

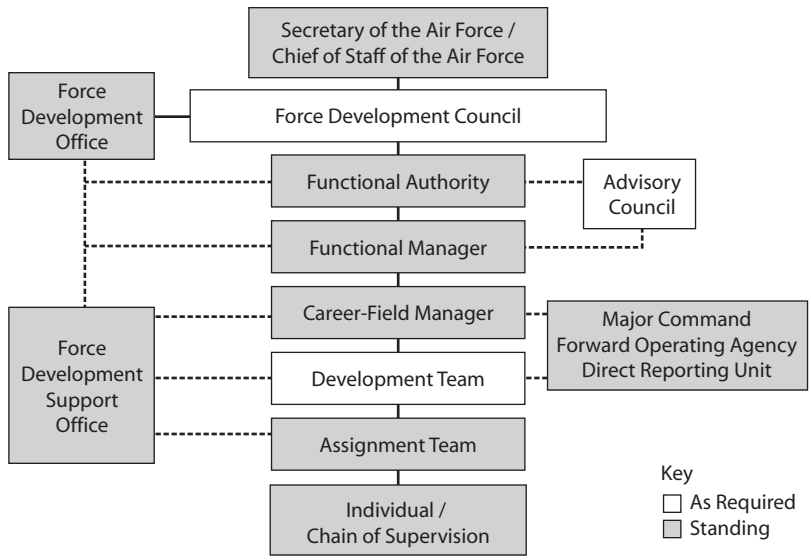


Figure 2. Force-development management structure. (Adapted from AFI 36-2640, *Total Force Development [Active Duty Officer]*, vol. 1, 23 January 2004, 22, http://www.e-publishing.af.mil/pubfiles/af/36/afi36-2640v1/afi36-2640v1.pdf.)

well as create overarching guidance for graduate education, thus integrating these concerns with all other force-development issues. DTs already have responsibility for reviewing the health and diversity of the force and for ensuring the consideration of functional and operational perspectives. Advanced education is a natural fit. Within the AADIM construct, the FDC develops AAD aggregation requirements, communicates the value of graduate education as both enabler and capability for each task force's concept of operations (CONOPS), articulates AAD requirements within the Air Force CONOPS, identifies future needs for advanced education, and integrates advanced education into the Capabilities Review and Risk Assessment process. This guidance then flows to each DT for incorporation into planning and guidance specific to each career field. This top-down approach to AAD management uses the FDC's coherent Total Force strategy to thoughtfully manage the overall health and professional development of career fields.

AADIM gives Air Force leadership an avenue to inject future needs quickly. Instead of waiting for unit-level requests to surface through the GEMS, AADIM starts with the FDC's vision to establish cutting-edge requirements and selection guidance. For example, as new cyberwarfare tactics, techniques, and procedures emerge, combatant commanders must currently draw from existing personnel pools for the necessary capabilities to fight the latest cyber threats. However, the GEMS sets educational quotas for a new AAD requirement only if a unit-level organization begins the process by submitting an updated request. In most cases, this new strategic need will not materialize from the unit level. Using AADIM, the FDC would set the strategic requirement for cyberwarfare officers. Without this oversight and senior-level input, the new requirement would take excessive time to implement.

As the Air Force's transformation efforts continue, AAD officer capabilities should become better integrated into the CONOPS and Capabilities Review and Risk Assessment processes. Whether on a rapidly changing battlefield or during the life cycle of a critical acquisition program, a correctly educated officer corps greatly enhances prospects for success. In their remarks to the Defense Subcommittee hearing on the Air Force budget for fiscal year 2005, former secretary of the Air Force James Roche and former chief of staff of the Air Force Gen John Jumper noted that "the [six] CONOPS [that support capabilities-based planning and the joint vision of combat operations] help analyze the span of joint tasks we may be asked to perform and define the effects we can produce. Most important, they help us identify the capabilities an expeditionary force will need to accomplish its mission, creating a framework that enables us to shape our portfolio."[15] We must also consider the relevant portfolio of AAD education to ensure that the knowledge base exists to execute these tasks successfully.

For example, a cursory evaluation of the types of AADs necessary to support the global-mobility CONOPS forms the basis for determining an appropriate forcewide mix of officer AADs (fig. 3). When expanded to all CONOPS, AADs become an enabling capability that enhances our war-fighting ability as well as improves the planning, programming, budgeting, requirements, and acquisition processes. This top-level strategic vision then flows to the DTs, which ascertain each career field's contribution.

Recall that, for each functional career field, DTs manage and oversee officers' professional development, including education. DTs—centralized teams with representatives from a cross section of the Air Force who help manage both the career field they represent and

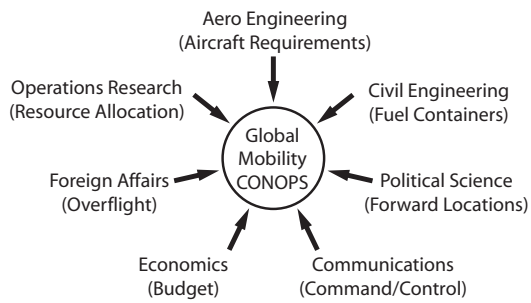


Figure 3. Notional AADs required within the global-mobility CONOPS

the development of individual officers—serve as the primary advocates for future assignments and career progression. Instead of relying strictly on unit requirements to drive AAD selection, AADIM leverages DT functionality by incorporating the FDC's Total Force strategy, officer preferences, existing health of the career field, and unit-level requirements to provide both individual AAD and career-field education vectors. Already involved with officer assignment and matching of professional military education, DTs would extend their advocacy and guidance to AAD selection. Through the DTs, AADIM provides specific planning to fulfill the FDC's Total Force AAD strategy. The DTs are uniquely positioned to analyze desired AAD capabilities, career-field needs, and current personnel inventories for the purpose of generating actionable goals. Using an end-state target, DTs can vector suitable officers to obtain AADs in a manner that simultaneously meets the career field's goals and enhances officers' professional development.

Within AADIM, career-field-specific "ideal AAD profiles" (fig. 4)—developed, reviewed, and updated by each DT—express these end-state goals. A time-phased, cumulative-growth function, each ideal profile shows the percentage of officers that should possess an AAD. One can decompose the aggregate profile to

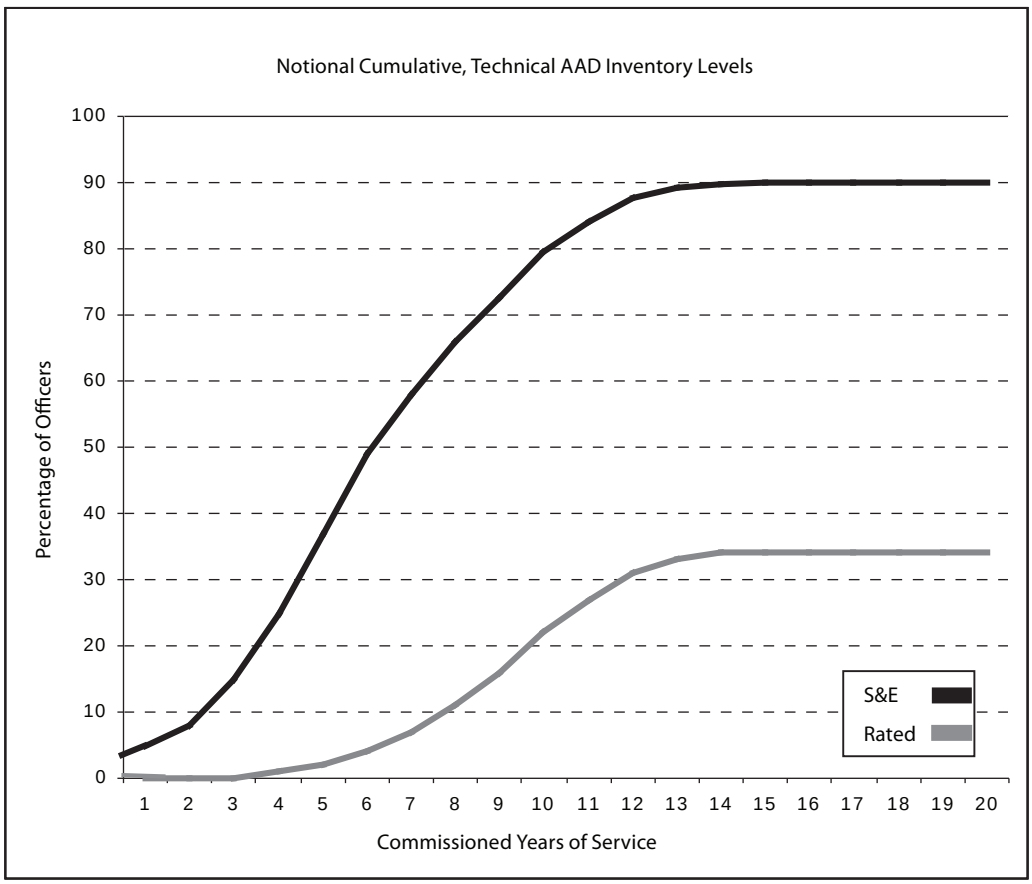


Figure 4. Notional ideal educational profile for science and engineering (S&E) officers and rated officers

show the force percentages desired for each academic discipline. Each career field's ideal profile reflects the specific needs as reconciled between FDC strategy and unit-level requirements. Using FDC's Total Force strategy, DTs can create and review specialized ideal profiles that include a great deal of unique information about their career field.

This inventory approach focuses on determining what a healthy officer inventory looks like and what capability-based manpower requirements we need for this career field. By starting with strategic vision, DTs can identify appropriate degree mixes, suggest educational-release rates, generate a long-range career-field vision, and inculcate educational expectations for the officer corps.

Note that educational profiles will not—indeed, should not—remain the same across the various career fields. For example, S&E officers typically require advanced degrees early during career progression—reflected in the notional profile for technical degrees (see fig. 4). This situation contrasts the profile of rated officers, whose early career expectations focus on operational duty. In this case, advanced education tends to defer more towards the midcareer point and consists of a broader range of both technical and nontechnical degrees. Such an educational profile, also notionally shown for the technical subset of degrees in figure 4, therefore assumes a different shape than that of S&E officers.

The foregoing profiles are not contradictory. They both reflect respective career-field imperatives and contribute to the Total Force strategy defined by the FDC; that is, such educational profiles document each DT's deliberate planning for AAD education. Note that AADIM does not focus exclusively on fully funded AADs. In fact, fiscal constraints will nearly always prevent adequate funding for meeting desired educational end states through resident education.

Ideal profiles encompass the total number of AADs received by the officer corps, irrespective of the educational method. Personnel may obtain these degrees through resident programs, internships, tuition assistance, distance learning, or as part of developmental education. Particularly for technical career fields, education opportunities at AFIT (in residence), the AFIT Civilian Institution, and the Naval Postgraduate School are highly valued. Career-field CONOPS and career-development guides, such as those published for scientists and engineers, should emphasize career-field-related advanced education, with the caveat that these resident-education options are limited, given fiscal and operational constraints.[16] Naturally, officers want to qualify for and apply for such programs, especially given the secretary and chief of staff of the Air Force's renewed emphasis on education by linking advanced degrees and the promotion process.[17] This is clearly a "win-win" philosophy for professional officers and Air Force strategy alike.

For officers not selected for resident education, whether by virtue of competition, availability, or academic qualification, the AADIM construct provides a method for the DTs to provide vectors towards alternative degrees and educational modes suitable for each officer's professional circumstance. These vectors would remain consistent with overall career-field end-state goals as documented in the respective ideal educational profile. The current system completely lacks such guidance and strategic forethought. The Officer Development Plan (ODP) provides the essential bridge between each officer's preferences and the DT.

This approach is not limited to individual vectors only. One strength of an inventory-management methodology lies with *career-field vectors*, broadcast via the Air Force Portal or published in updates to career-development guides. In cases in which fully funded AADs cannot remedy a specific degree shortage, DTs can provide career-field vectors recommending fields of study for their officers to consider, based on capabilities assessments and the FDC's Total Force strategy.

These career-field vectors serve as the basis of managing long-term educational health. Recently completed AADIM studies examine the development of user-friendly Microsoft Excel–based tools to create ideal profiles, forecast future inventories, and propose appropriate education quotas for advanced education, both fully funded and otherwise.[18]

Drawing on current personnel data taken from the Military Personnel Data System and AADIM-model forecasts, AADIM provides a list of actionable recommendations to improve shortages and manage the mix of AADs based on a DT's implementation policies, such as planning-time horizon and maximum educational-release rates.

Take for example a sample AADIM analysis of AADs for an arbitrarily selected career field (figs. 5 and 6). Figure 5 compares the ideal profile to officer AAD data drawn from the Military Personnel Data System. The example depicts a relatively "healthy" current educational status, in that the aggregate number of educated officers approaches the desired levels. However, further analysis reveals a potential future concern: education for officers in the first three groups lies below expectations, and disproportionately large numbers of educated officers are nearing retirement eligibility. Figure 6 depicts AADIM spreadsheet modeling of the capability to calculate and propose future education quotas, given any desired "get-well" time horizon (e.g., eight, nine, or 10 years), to achieve a career-field education status that mirrors the ideal profile.[19] The model also partitions the recommended quotas by career phase point (not shown in fig. 6).

When fully funded education is not feasible, DTs can use the foregoing analyses for both career-field and individual AAD vectors to correct shortages and achieve the desired mix of degrees. But this powerful analysis tool does not currently exist. However, the medium for such feedback already exists via the ODP, once we add fields applicable to educational preferences, qualifications, and vectors to this tool.

Recommendations

The following proposals will move us towards integrating advanced education into Total Force development.

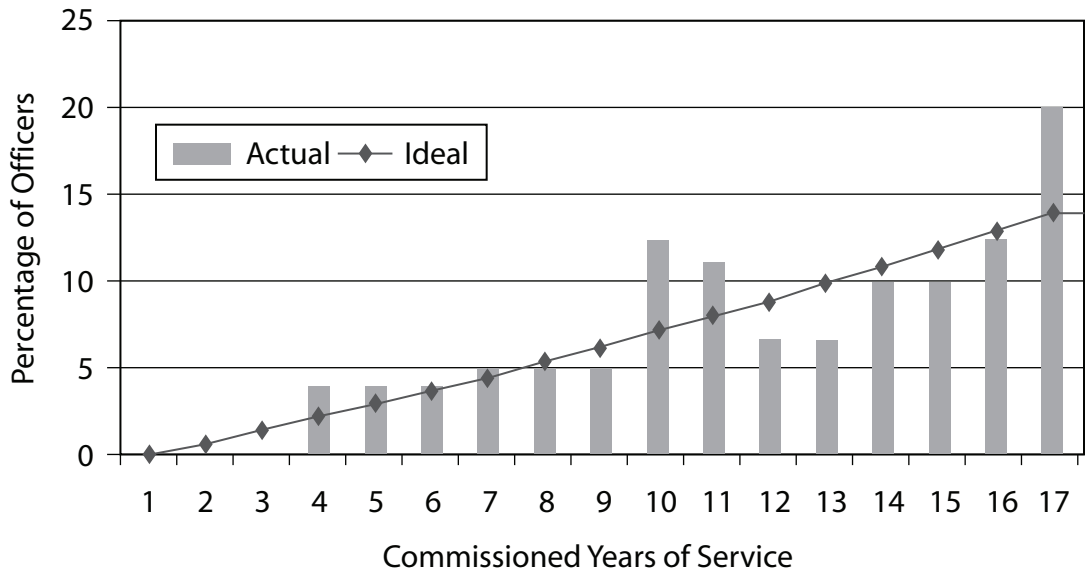


Figure 5. Sample snapshot of AADIM waterfall "educational health." (Reprinted from Maj George M. Reynolds and Maj Aaron D. Troxell, *Inventory Management of Advanced Academic Degree Officers: Advocacy and Spreadsheet Modeling*, Graduate Research Project [Wright-Patterson AFB, OH: Department of Operational Sciences, Air Force Institute of Technology, May 2006], appendix B.)

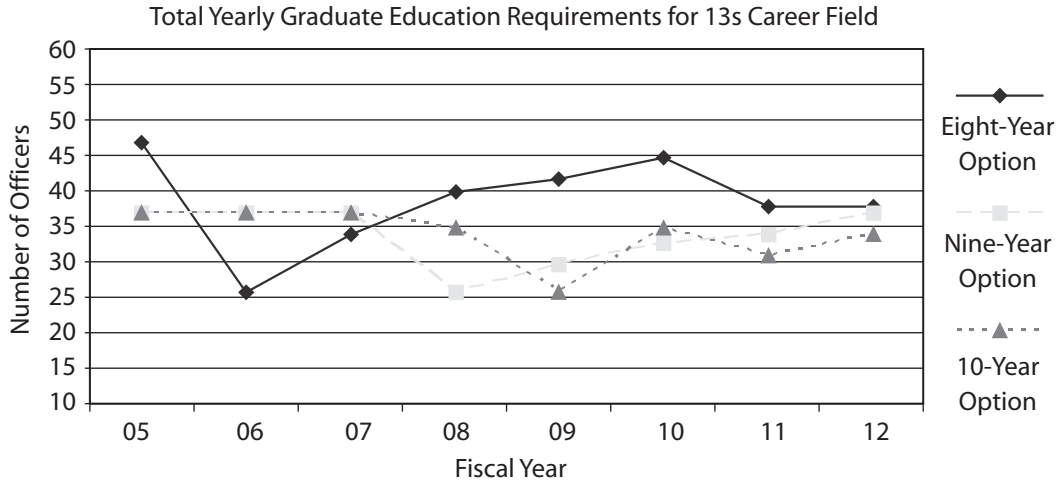


Figure 6. Sample AADIM annual quota recommendation. (Reprinted from Capt Andrew D. Jastrzembski and Lt Col Raymond W. Staats, "Inventory Management for Air Force Advanced Academic Degree Officers" [briefing charts presented at the 73rd Military Operations Research Society Symposium, West Point, NY, June 2005], 23.)

Remove the Graduate Education Management System from Air Force Instruction (AFI) 36-2302,* Professional Development (Advanced Academic Degrees and Professional Continuing Education), *11 July 2001

The GEMS does not satisfy the objectives of Total Force development initiatives because it does not consider long-term career-field health, makes no provision for including DTs in the selection process, and effectively conducts AAD processes as training concerns rather than as professional education. Even as a training and utilization concern, the GEMS has proved less than successful, a fact documented long ago by the Air Force Audit Agency.[20] We need an entirely new approach—so much so that revisions to the current instruction are insufficient. Such an effort will be subject to the *anchoring effect*, described by Robert Clemen and Terence Reilly as the tendency to use the status quo as the baseline for planning decisions, often reverting to this point rather than pursuing opportunities perceived as radical departures from established practice.[21] Attempting to reform the current system is not enough; it needs to be replaced. To fully remove the Air Force from a failing GEMS, we should rescind the applicable portions of AFI 36-2302 in favor of the AADIM approach.

Revise Department of Defense Directive (DODD) 1322.10*, Policy on Graduate Education for Military Officers, *26 August 2004

The GEMS draws much of its inspiration from several key paragraphs in DODD 1322.10, which requires periodic reviews of graduate education programs to ensure the funding of appropriate academic disciplines and proper utilization of officers receiving funded education. The mechanism involves identifying, validating, and listing—by billet—those duties requiring advanced education for *optimal* incumbent performance and comparing this list biennially against a list of officers having received corresponding advanced degrees.[22]

This listing requirement is the basis for the ineffective system encompassed by AFI 36-2302. Although the AADIM construct can comply with these requirements, they impose a bureaucratic layer that adds no value, given the strategic oversight inherent via the FDC and the

DTs. Indeed, these requirements hinder compliance found elsewhere in DODD 1322.10, in particular, paragraph 4.2, which states that "the Military Services shall have the authority to provide graduate education to their military officers in sufficient numbers and disciplines to accomplish the missions of the Military Services."[23] An examination of current and historic AAD billet-incumbency rates makes clear that the GEMS cannot achieve strategic educational goals. AADIM implements the spirit of this directive as a CONOPS enabler, with AADs recognized as an integral military capability. Further, as put forth in the preceding recommendation, such a revision to DODD 1322.10 removes AADIM from any anchoring to the GEMS legacy. Finally, revision supports current DOD guidance to develop competency-based management tools for all military education.[24]

Note that although payback is essential as a return on educational investment, it is already assured by active duty service commitments as required under Title 10 *US Code*, section 2005: "The Secretary providing advanced education assistance to any person, that such person . . . shall agree . . . to serve on active duty for a period specified in the agreement."[25] Personnel meet this fundamental requirement irrespective of whether the GEMS or AADIM serves as the implementing construct.

Implement the AADIM Construct via Incorporation into AFI 36-2640

The Total Force development construct provides an ideal implementation vehicle for AADIM. The FDC structure established by AFI 36-2640 allows treatment of advanced education as a strategic capability. AADIM fits well within the FDC construct and enhances existing Total Force development initiatives through the DTs and tools such as the ODP. AADIM also molds into the current Air Staff/A1 "Continuum of Learning" initiative.[26] AADIM provides for a standardized approach to graduate education across career fields, using DTs as the focal point and the FDC as the coordinating and strategy-setting body.

We should create new educational data fields for the ODP that include officers' desires and DT vectoring for advanced degrees. Doing so will place the appropriate focus on education for officers and will support the Air Force's renewed emphasis on graduate-education opportunities as a part of career development. As concepts such as specialty-relevant distance learning develop, reviewers and DTs will have the means to articulate a broader range of vector options for graduate education.

Align Educational Strategies across the Total Force

We should reexamine unit requirements for advanced education, currently identified locally and validated functionally, to align with policies for strategic education. Furthermore, we should include education as part of each officer's "menu of competencies," which recognizes the inappropriateness of strictly identifying officer education by one of more than 3,500 academic codes currently found within the GEMS.[27] The knowledge and skills acquired from a particular academic degree overlap substantially with those for many other degrees. For example, two degrees offered at AFIT—operations research (coded 0YEY) and operations analysis (coded 0YEA)—are very closely related, distinguished only by the degree of expertise in the general field (in this case, operations research demands more theoretical depth). However, an 0YEY officer does not receive "payback credit" for serving in an 0YEA billet, which the current GEMS considers as having a nonqualified incumbent. The AADIM construct, capable of recognizing required duty competencies, alleviates this issue.

Conclusion

Achieving Total Force development's vision for graduate education to support CONOPS with AAD capabilities relies on healthy career fields—not resource utilization and tracking. The AADIM approach represents the right step towards formulating a coherent strategy for the development of graduate education. It incorporates an FDC Total Force strategy with the experiences and guidance of DTs while placing selection of personnel for graduate education in step with the initiatives of Total

Force development. The educational health of career fields and the professional development of individuals become primary focuses rather than afterthoughts. AADIM separates the idea of selection from tracking and utilization, thereby ensuring that the validation process does not replace smart policy. Viewing graduate education for what it is meant to be—lifelong education and a strategic capability—highlights the need for a change to the existing inadequate system. ❑

Notes

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5. Ibid.
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15. Senate, *Defense Subcommittee Hearing on the FY05 Air Force Budget: Testimony of the Honorable James G. Roche, Secretary of the Air Force, and General John P. Jumper, Chief of Staff, U.S. Air Force*, 108th Cong., 2d sess., 24 March 2004, http://www.globalsecurity.org/military/library/congress/2004_hr/040324-roche-jumper.htm.
16. See Secretary of the Air Force/Science, Technology, and Engineering Directorate (SAF/AQR), *Concept of Operations for Scientists and Engineers* (Washington, DC: SAF/AQR, September 2001); and idem, *Career Development Guide for Scientists and Engineers* (Washington, DC: SAF/AQR, May 2003).
17. "SECAF/CSAF Letter to Airmen."
18. Capt Andrew D. Jastrzembski, "Advanced Academic Degree Inventory Management Model" (master's thesis, Air Force Institute of Technology, Wright-Patterson AFB, OH, March 2005), iv; Capt Andrew D. Jastrzembski and Lt Col Raymond W. Staats, "Inventory Management for Air Force Advanced Academic Degree Officers" (briefing charts presented at the 73rd Military Operations Research Society Symposium, West Point, NY, June 2005), 8; and Maj George M. Reynolds and Maj Aaron D. Troxell, *Inventory Management of Advanced Academic Degree Officers: Advocacy and Spreadsheet Modeling*, Graduate Research Project (Wright-Patterson AFB, OH: Department of Operational Sciences, Air Force Institute of Technology, May 2006), iv.
19. Reynolds and Troxell, *Inventory Management*, appendix B.
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22. DODD 1322.10, *Policy on Graduate Education*, par. 1.
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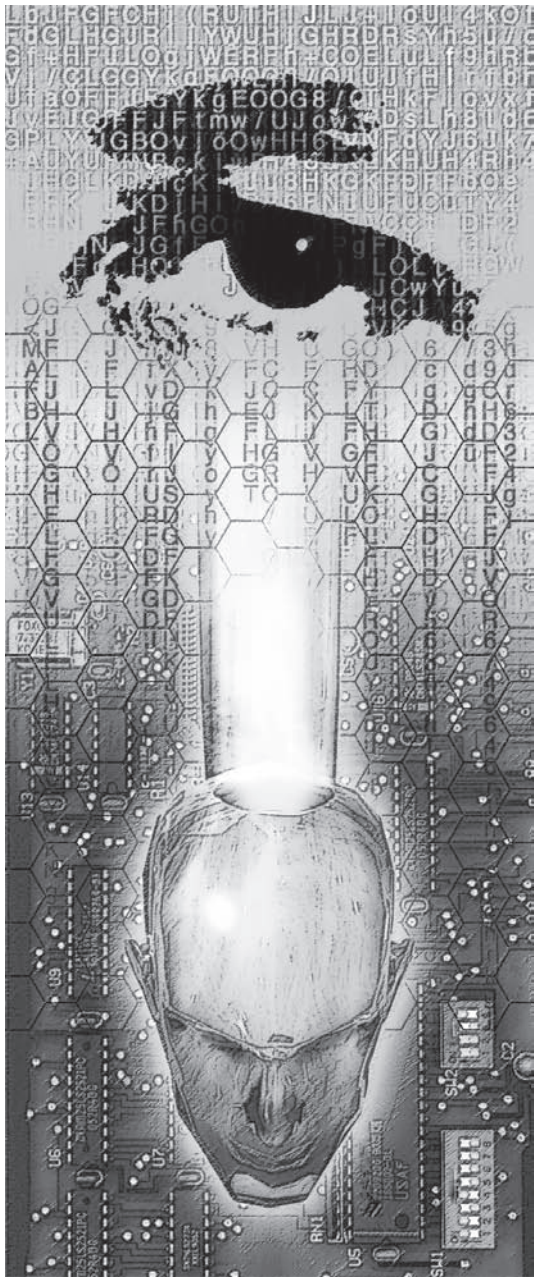
27. Dr. Bruce Murphy, chief academic officer, Air University "Air University Supply Side (Continuum of Education) Model Brief" (presented to the Air University Learning Symposium, Maxwell AFB, AL, 3–5 May 2006), 4.



Defining Information Operations Forces

What Do We Need?

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Editorial Abstract: For years national leadership has called for an information operations (IO) career force, but the broad range of skills required has prevented implementation. This article analyzes current doctrinal definitions to determine the need for such a force and outlines recommendations for network-warfare and influence-operations-planner career forces as well as operational-security Red Teams. It also advocates better integration of IO theory into the Air Force.

IN 2001 THE *Quadrennial Defense Review Report* mandated that the military treat information operations (IO) not merely as an enabling function but as a "core capabilit[y] of future forces."[1] In 2002 the *Defense Planning Guidance, 2004–2009* directed the development of an "IO Roadmap" that would "address the full scope of IO," including a "career force."[2] The following year, that road map recommended "establish[ing] an

IO career force" and "develop[ing] IO planners."[3] Most recently, the *Quadrennial Defense Review Report* of 2006 again highlighted the need for IO forces.[4] Although the military services have made some progress toward carrying out these directives, they have not yet come close to fulfilling their intent.

Our struggles come as no surprise. They are due in no small part to our inability to answer the question, what exactly constitutes an "IO force"? Given the broad definition of IO, it has proven difficult to create a professional whose training and education encompass the broad set of skills required to operate across the full spectrum of IO. Having to contend with so many disparate parts, how can we define—much less build—such a force? In fact, we cannot. No single "career force" can cover all of IO.

Realizing this fact, each military branch has approached the problem piecemeal, attacking those elements of IO most supportive of its own objectives, missions, and competencies. The Army has defined an IO functional area and has matured portions of the psychological operations (PSYOP) mission. The Navy has focused mainly on electronic warfare (EW) and network warfare (NW), as has the Air Force. The Air Force recently began to address the idea of an NW force but has yet to define an Air Force specialty (AFS) or organize most effectively for use by combatant commands.[5] Throughout these efforts, no branch has provided a clear vision for where we want to go or a corporate strategy for how to proceed.

This article attempts to answer the question, what is an IO force? and determine those elements necessary to fulfill the directives of the past six years. In this regard, it analyzes the doctrinal definition of IO (and its mission areas), examines capabilities that currently conduct operations for these mission areas, and presents a gap analysis for existing shortfalls. It concludes with four recommendations that could help fulfill these directives. Although the focus of this article remains on the Air Force (largely by design), its theory, ideas, and recommendations may prove useful to the other services.

Words Are Important

In defining operational forces for IO, one finds it useful to describe IO in operational terms. As planners and operators, we characterize operations using words such as *domains*, *effects*, *targets*, and *capabilities*. Unfortunately, we find variations in the meanings of these common terms throughout the Department of Defense (DOD) (if they are defined at all). For our purposes, this article uses a combination of definitions adopted by joint doctrine and the Battlespace 21st Century (B21) model.[6]

Our universe consists of three primary domains: physical (including the terrestrial, atmospheric, marine, space, and electromagnetic [EM] environments as well as the tangible components contained within them), cognitive (the single and collective consciousness that exists in the minds of individuals),[7] and information (existing within both the physical and cognitive domains and hosting the creation, manipulation, storage, and sharing of data and information).[8]

An operational domain represents a portion of one or more primary domains chosen for a specific national or military operation.[9] Essentially, it is an artificially defined (in that it is defined by humans), bounded area of the universe. For example, the operational domain within which the Air Force traditionally operates is made up of parts of the physical (atmospheric, space, terrestrial, and the EM environments), cognitive (the minds of the participants), and information domains (the data and information associated with the operations at hand). Another example, pertinent to the discussion that follows, is cyberspace. The cyberspace operational domain is "characterized by the use of electronics and the electromagnetic environment to store, modify, and exchange data and information via networked systems and associated physical infrastructure."[10] From this definition, we can see that cyberspace consists of elements of the physical (the physical electronic components as well as the EM environment), cognitive (the "mind" of any automated decision maker), and information domains (the data and information confined within its physical architecture).

Within any operational domain, *capabilities achieve effects against specific targets*. Leveraging joint doctrine, we define a *target* as "an area, complex, installation, force, equipment, capability, function, or behavior identified for possible action to support the commander's objectives, guidance, and intent."[11] Using the same reference, we define an *effect* as "a change to a condition, behavior, or degree of freedom" to one or more targets.[12] Finally, we draw upon the B21 model to define *capabilities* as "the combination of military equipment (weapons systems, tools, software, etc.), personnel, logistics support, training, and resources that provide the ability to achieve effects against targets in one or more domains."[13]

Having defined some operational terms, we turn to the current doctrinal meaning of IO, defined by Joint Publication 3-13, *Information Operations*, as "the integrated employment of the core capabilities of electronic warfare, computer network operations, psychological operations, military deception, and operations security, in concert with specified supporting and related capabilities, to influence, disrupt, corrupt or usurp adversarial human and automated decision making while protecting our own."[14] DOD- and service-level doctrines adhere to this definition and further define the "core capabilities" identified therein.[15] Unfortunately, the terms and definitions for these capabilities vary somewhat. Further, DOD-, joint-, and service-level doctrines present a number of additional terms intended to help further characterize IO. The table on the next page identifies those that make up a good portion of the entire scope of IO. The sheer number of disparate terms, however, tends to muddy the waters rather than bring clarity to an already murky subject.

For simplicity's sake, we confine our analysis to the following terms: *EW*, *CNA/NetA*, *CND/NetD*, *PSYOP*, *MILDEC*, and *OPSEC* (see table). In doing so, we consider all definitions of these terms as presented in national-level directives and in joint, Army, Navy, and Air Force doctrine. However, we refrain from referring to these terms as capabilities (as does most doctrine), contending that they represent a combination of capabilities, domains, and effects (as we have defined these terms earlier). Consequently, they are referred to hereafter simply as mission areas.

A Review of the Information-Operations Mission Areas: Characteristics, Capabilities, and Career Paths

The following discussion reviews each mission area of IO, translates its definitions into operational terms, and performs a gap analysis of current capabilities and career forces responsible for that mission area. It introduces each mission area by identifying the common characteristics found within DOD-, joint-, and service-level doctrinal definitions and then using these characteristics to restate the mission area in operational terms. Viewed in this operational context, each analysis concludes by identifying those capabilities and effects required to conduct operations effectively for the mission area and by evaluating these requirements against existing capabilities. For organizational purposes, and in conformance with AFDD 2-5, *Information Operations*, we combine the analysis of CNA/NetA and CND/NetD under the heading of NW and the analysis of PSYOP and MILDEC under the heading of influence operations. However, due to its unique nature, OPSEC, normally associated with influence operations, is examined separately.

Electronic Warfare

An analysis of current doctrine shows that EW involves the use of EM or directed energy and includes offensive or defensive operations affecting the EM spectrum.[16] Translating these characteristics into operational terms, we see that the EW mission area consists of *capabilities* which use EM energy or directed energy to achieve their *effects* and that those effects occur within the *EM environment* (physical domain).

A review of current Air Force capabilities shows that many of today's weapons systems use EM energy to achieve their effects. Most of these come in the form of airborne jamming

Table. Common Information Operations Terms

Term	*Joint Doctrine Identification*	*Air Force Doctrine Identification*	*Army Doctrine Identification*	*Navy Doctrine Identification*
EW / EW Operations (EWO) (USAF-only term)	Core Capability	Capability	Core Capability	Core Capability
Electronic Attack	Action of EW	Military Capability of EWO	Component of EW	Subdivision of EW
Electronic Protect	Action of EW	Military Capability of EWO	Component of EW	Subdivision of EW
EW Support	Action of EW	Military Capability of EWO	Component of EW	Subdivision of EW
Computer Network Operations (CNO) / Network Warfare Ops (NW Ops) (USAF-only term)	Core Capability	Capability	Core Capability	N/A*
Computer Network Attack (CNA) / Network Attack (NetA) (USAF-only term)	Action of CNO	Operational Activity of NW Ops	Core Capability	Core Capability
Computer Network Defense (CND) / Network Defense (NetD) (USAF-only term)	Action of CNO	Operational Activity of NW Ops	Core Capability	Core Capability
Computer Network Exploitation / Network Support (USAF-only term)	Related Enabling Operation of CNO	Operational Activity of NW Ops	Core Capability	N/A
Information Assurance	Supporting Capability	Integrated Control Enabler (part of Net Ops)	Supporting Capability	Supporting Capability
Influence Operations	N/A	Capability	N/A	N/A
PSYOP	Core Capability	Military Capability of Influence Operations	Core Capability	Core Capability
Military Deception (MILDEC)	Core Capability	Military Capability of Influence Operations	Core Capability	Core Capability
Operations Security (OPSEC)	Core Capability	Military Capability of Influence Operations	Core Capability	Core Capability
Physical Attack / Physical Destruction	Supporting Capability	Supporting Capability of Influence Operations	Supporting Capability	Supporting Capability
Counterintelligence	Supporting Capability	Military Capability of Influence Operations	Supporting Capability	N/A
Public Affairs	Related Capability	Military Capability of Influence Operations	Related Activity	Supporting Capability
Counterpropaganda	Action taken by Public Affairs	Military Capability of Influence Operations	Supporting Capability	N/A
Counterdeception	N/A	N/A	Supporting Capability	N/A
*N/A = term not referred to in core doctrine document				

Sources: Joint Publication 3-13, *Information Operations*, 13 February 2006, II-1 through II-9; Air Force Doctrine Document (AFDD) 2-5, *Information Operations*, 11 January 2005, 5–25; Field Manual 3-13, *Information Operations: Doctrine, Tactics, Techniques, and Procedures*, 28 November 2003, 1-14, 2-7, 2-8; and Navy Warfare Publication 3-13, *Navy Information Operations*, 2003, 13 and 2-6.

and collection assets. However, we have made progress in the area of space control, which also produces effects in the EM environment.[17] In addition to achieving offensive effects, all of these capabilities use measures within the EM environment to deconflict their profiles or protect themselves from enemy attacks.

Career fields and training strategies for the EW mission area are relatively mature. Airborne EW systems are typically integrated within each platform, and the flying community has a recognized career path and qualification program for personnel assigned to use these systems. Typically these individuals are identified under the navigator (12XXX) AFS, associated with a particular platform, and designated with an AFS prefix, which highlights their specialty as an EW airborne operator. Space-control capabilities that use EW assets are primarily manned by personnel from the space and missile operations AFS (13SXX) and follow the career path specified under that career field.

Although this represents only a cursory analysis, we see that the Air Force maintains capabilities that fulfill the immediate needs of the EW mission area. Its systems can achieve a number of effects within the EM environment, and the associated forces have well-established career paths and appropriate training. Therefore, the Air Force does not require additional capabilities or career forces for the EW mission area of IO.[18]

Network Warfare

NetD and NetA involve the use of hardware, software, and network-based capabilities to conduct defensive and offensive operations, respectively.[19] NetD operations protect and defend friendly information systems, computer networks, and information transiting within them. In addition, they protect against the NetA capabilities of others. NetA operations traverse through computers or computer networks to offensively affect them or the information resident therein.[20] Translating these characteristics into operational terms, we see that the NW mission area consists of both NetD and NetA *capabilities*, the former using computer networks (network-based) to produce *defensive effects* that protect our friendly spaces of the *cyberspace operational domain*, and the latter using computer hardware or software to traverse the *cyberspace operational domain* and achieve *offensive effects* within it.

The Air Force has made significant progress in the area of NetD capabilities but still finds itself primarily confined to software-patch updates, virus protection, and network-perimeter defense. While the commercial world continues to make advancements in areas such as spyware and rootkit detection, the corporate Air Force has implemented few of these tools or techniques. The DOD limits detailed discussion of NetA capabilities to classified forums, so further discussion here is not possible. Suffice it to say that the service still needs a well-structured, efficient capability-development strategy to keep up with current advances in technology.

Neither dedicated forces nor a mature training strategy exists for the NW mission area. Individuals from a mix of different specialties fill NetA positions at all levels of operation. NetD positions at the tactical level are more standardized in that they primarily include communications personnel (33XXX/3C0XX). However, at the operational and strategic levels, NetD personnel are just as varied as their NetA brethren. Most individuals assigned to NW positions are considered on "career broadening" tours and are expected to return to their designated career-field path upon completion of the NW assignment.

Lack of dedicated forces affects the potency and maturity of these forces. NW units require unique training and experience to perform the technical aspects of their mission. Unfortunately, these units must rely significantly on the prior experience and formal education of new arrivals. Some of these individuals may have previous training in basic computer and networking concepts, but many possess little technical expertise. We can conduct training at the gaining unit (what occurs today), but such instruction takes time and money, shortens the operational "shelf life" of the individual, and detracts from mission accomplishment. Lastly, the fact that we "borrow" all personnel

from other career fields affects continuity and typically results in the loss of such expertise at the conclusion of the tour. Some may argue that such disbursement strengthens the Air Force as a whole, but it provides little in the way of providing a mature, experienced NW war-fighting force.

Influence Operations

AFDD 2-5 describes influence operations as those "affecting the perceptions and behaviors of leaders, groups, or entire populations," including PSYOP and MILDEC within its definition.[21] PSYOP involves conveying selected information and indicators to foreign audiences to influence their emotions, motives, attitudes, objective reasoning, and behavior. MILDEC operations (whether offensively or defensively focused) mislead adversary decision makers in order to cause them to take actions (or not act) in accordance with friendly objectives.[22] Viewed in operational terms, the influence-operations mission area consists of *capabilities* that produce *effects* within the *cognitive domain.*

Any weapons system and/or platform within the Air Force can achieve effects within the cognitive domain (albeit not directly). For example, an F-15 may destroy a supply truck, which, in turn, disrupts an adversary's fuel supply, which then denies the adversary use of his aircraft. The inability to field aircraft may then influence the adversary to capitulate. Consider also the positioning of the 5th Marine Expeditionary Brigade off the coast of Kuwait during Operation Desert Storm, an action that helped deceive Iraq as to the direction of the allied advance and influenced Saddam Hussein to reposition his defenses. Admittedly, we will need many capabilities not yet in existence to achieve certain cognitive effects. However, such capabilities will always depend upon a commander's established mission objectives. Without a thorough analysis of current and future combatant-commander requirements, we cannot identify all needed capabilities here. Such analysis lies beyond the scope of this article. We move forward with the assumption that current kinetic and nonkinetic weapons systems and military assets can fulfill immediate requirements to conduct influence operations and have the potential to achieve necessary effects within the cognitive domain.

Although career paths and trained personnel already exist for most Air Force weapons systems and platforms, training in the art of influence operations remains limited. Schoolhouse and weapons-school focus does not extend far beyond the tactical-level effects of deny, disrupt, degrade, and destroy. This is not to say that psychological effects or MILDEC does not exist or that we do not conduct them, but most operators receive little formal training in these areas. The concepts taught—if at all—are system specific and constrained to the tactical level. Few personnel receive formal training in planning and executing influence operations at the operational and strategic levels through the application of our full range of national capabilities. Some career forces that specialize in affecting the cognitive domain do exist, however. The Army has a handful of specialists trained in some aspects of influence operations.[23] The Air Force has public-affairs forces, but necessarily restrictive rules of engagement limit their capabilities. Cultural attachés or foreign area officers also receive training in related skill sets, but even these have limited scope. In essence, the Air Force lacks a cadre of individuals with the training and experience necessary to produce mature, sophisticated effects within the cognitive domain (i.e., those that leverage arts and sciences such as marketing, psychology, and sociology). The state of operations in Iraq offers a perfect example of why we need such training now and in the future. Our inability to cultivate personnel trained in these skills may have led to our failure as a department to affect the cognitive domain and quickly establish conditions conducive to long-term stability and democracy.[24]

Operations Security

Doctrinally, the definition of *OPSEC* is standardized throughout the DOD.[25] In operational terms, the OPSEC mission area consists

of *capabilities* that achieve the *effects* of identifying critical information about friendly forces, analyzing friendly actions, and determining indicators that hostile intelligence systems might obtain which could be interpreted or pieced together to derive critical information in time to be useful to adversaries. In addition OPSEC includes *capabilities*, which conduct defensive *effects* that eliminate or reduce vulnerabilities of friendly actions to adversary exploitation. The effects produced can take place anywhere within the associated *operational domain* and can involve the use of many different capabilities (whether kinetic or nonkinetic, a national or military asset, or at the strategic, operational, or tactical levels).

Air Force Policy Directive (AFPD) 10-11, *Operations Security*, directs "commanders at every level [to] establish a program that ensures OPSEC is fully integrated into their mission responsibilities."[26] Local OPSEC managers rely on Air Force Instruction (AFI) 10-701, *Operations Security (OPSEC)*, to develop and execute their local programs.[27] The program is well documented and appears well structured on paper. Unfortunately, most OPSEC managers take on these responsibilities as an additional duty instead of as a full-time job, and many find themselves ill equipped to perform the type of vulnerability assessments necessary to meet the requirements identified in these regulations. Thus, more often than not, they implement only the minimum requirements (e.g., unit training and development of a critical-information list)—enough to pass an inspection but not enough to defend effectively against enemy observations. The most effective capabilities we have today come in the form of multidisciplinary vulnerability assessments (MDVA). Unfortunately, few units in the Air Force conduct these at this time.

Not part of a focused career field, OPSEC managers are appointed locally from available personnel at each level of command. They receive standardized training—mostly consisting of a threat overview and brief summary of the five-step OPSEC process—but very little instruction in OPSEC tactics, techniques, and procedures (TTP). Any continuity relies strictly on the ambition of their predecessors. Typically, long-term, experienced OPSEC managers do not exist. Their appointments are considered a secondary duty, and they tend to be junior personnel.

Recommendations

The preceding section characterized, in operational terms, the different mission areas of IO. It identified each area's capabilities and effects and defined the domains within which each one operates. In addition, an analysis of current capabilities and career forces highlighted shortfalls that contribute to our inability to execute certain mission areas effectively. We now address these gaps with four recommendations intended to help fill them. Specifically, these include the establishment of both an NW-operations career force and an influence-operations-planner career force, OPSEC Red Teams at the base and major command (MAJCOM) levels as well as full-time OPSEC managers, and a more effective integration of IO theory within the corporate Air Force.

Network-Warfare-Operations Career Force

NW forces should have both technical training in the use of computer hardware and/or software and the ability to use such equipment to produce offensive and/or defensive effects within the cyberspace operational domain. Junior officers are experts in one or more "classes" of networks (e.g., Internet protocol–based networks, process-control networks, telephony, etc.)[28] with experience in both offensive and defensive operations at the tactical level. Senior officers have the background necessary to leverage a variety of NW capabilities in order to plan and execute integrated operations at the operational and strategic levels.

NW forces have their own AFS and career-force managers. Their dedicated development team (DT) at the Air Force Personnel Center (AFPC) works to ensure that each individual obtains tactical-level expertise and experience in a variety of NW capabilities and skill sets during his or her junior years. This ensures that NW operators acquire the foundation

necessary to serve MAJCOM and combatant commands as skilled planners and staff personnel during their midgrade years. Senior personnel lead NW units and organizations at the tactical, operational, and strategic levels.

These forces have their own education and training path similar to those that currently exist for other operations career fields (e.g., pilots and space operators). Air Education and Training Command handles the formal undergraduate and graduate training of new accessions who pass stringent aptitude tests. Undergraduate training covers core fundamentals such as operating systems, architecture, and networking as well as basic force application, including attack, evasion, and exploitation techniques. Graduate training improves upon these skills but focuses on a specific network class.[29] Following graduation from these two programs, qualified operators move on to their gaining operations unit, where they receive training in local policy and procedures. A numbered air force or MAJCOM-level cyber command oversees recurring training and standardization/evaluation while an expansion of the USAF Weapons School implements advanced tactics.

Influence-Operations-Planner Career Force

These forces would be practiced in arts and sciences such as psychology, sociology, and marketing with an understanding of how to integrate national and military assets to conduct sophisticated effects within the cognitive domain. Junior officers are experts in the creation of tactical-level effects using one or more different capabilities (e.g., those of the land, sea, air, and cyberspace). Midgrade officers can integrate a variety of capabilities to create operational-level effects (e.g., joint operations and military campaigns), whereas senior-level officers have the experience necessary to plan and execute more strategic-level effects (e.g., foreign-policy development and long-term planning).

Like NW forces, influence-operations planners have their own AFS, career-force managers, and DT at the AFPC. They spend their junior years embedded within a variety of tactical units (e.g., armor battalions, air squadrons, and surface fleets), where these planners hone their craft and apply techniques during exercise and real-world situations. They spend their midgrade years at the MAJCOMs and/or combatant commands leveraging the expertise gained during earlier years but now applying it at the operational and strategic levels. Planners could also serve a tour in a joint strategic-communications organization before taking on more senior roles that affect national policy and strategy.[30]

Influence-operations planners receive formal undergraduate training in skills such as applied psychology, sociology, and marketing. Much of their early development results from experiences within a variety of tactical-level capabilities and scenarios. Additional professional military education (PME) coursework includes topics such as military operations, command-and-control authorities, and law. Midgrade assignments also include cultural immersion in one or two particular theaters and possibly a media posting aimed at honing public-communication skills.[31] Continuous coursework in such subjects as organizational behavior, foreign policy, world religions, cultural studies, and strategic communications becomes required as planners move into their mid and senior years.

OPSEC Red Teams and Full-Time OPSEC Managers

OPSEC managers would still provide the lead for command-directed requirements. However, their full-time status now gives them the time to implement effective OPSEC programs. Red Teams provide vigilant support to the unit OPSEC managers by regularly conducting MDVAs for their base or MAJCOM. MAJCOM Red Teams conduct assessments from a more regional perspective. Red Teams and unit OPSEC managers are closely connected with the counterintelligence community, thus ensuring that OPSEC tactics and effects mirror—but are not limited to—expected adversary methods. Together, these individuals work to continuously mitigate OPSEC vulnerabilities and counter adversary threats.

No specific career field or path is envisioned for either OPSEC managers or Red

Team personnel.[32] Positions are filled by individuals from a variety of backgrounds, and OPSEC assignments are treated as career-broadening opportunities. However, OPSEC planners at the operational and strategic levels should have previous experience as an OPSEC manager or Red Team member. All OPSEC personnel receive initial qualification training at the local unit in areas such as social engineering, physical security, and collection of open-source intelligence; they acquire more advanced skill sets through on-the-job training. Well-documented TTP manuals maintain continuity and advances in this art, which are passed on during initial and recurring training of new personnel. As with all IO mission areas, "best practices" are maintained in the appropriate Air Force TTP series volume for use by all OPSEC personnel.

More Effective Integration of Information Operations Theory within the Corporate Air Force

In addition to heeding the mission-area-focused recommendations mentioned above, we must more effectively integrate the doctrinal concepts of IO into the corporate Air Force. After all, just as all Airmen must understand air and space theory, we must also understand IO theory if it is to truly become a "core capabilit[y] of future forces."[33] This integration must occur in two ways: (1) through improved education within PME curricula, and (2) (and more fundamentally) as an underlying cultural change in how we approach all operations (whether kinetic or nonkinetic).

PME exposes every member of the Air Force, regardless of specialty, to air and space power doctrine during different stages of his or her career. Although this coursework includes IO to some extent, such lessons remain largely theoretical, provide little or no instruction on how to apply its concepts to existing operations, and do little more than provide interesting points to ponder. In short, IO lessons at present have little or no substantial operational value to their recipients—a situation that one can attribute to the nascency of Air Force IO itself. In some aspects, we are just learning how to effectively "do" the mission areas of IO, and in many respects, we lack in-depth, mature operational experience—the lessons learned from which we distill our doctrine. However, as we continue to expand our operational knowledge and abilities in this area, the Air Force must expose all personnel to its evolving doctrinal concepts. In addition, we must strive to better integrate our developing IO-power doctrine seamlessly with that of air and space power and, as it matures, demonstrate its utility to real-world operations.

The second approach to corporate integration requires a shift in culture. For years, leadership has realized the importance of integrating IO within all other operations, yet we have not completely succeeded—due in large part to the fact that we have defined IO too broadly, as mentioned earlier. However, in our effort to move forward, we have effectively sidestepped integration and instead simply developed IO as a separate entity. In doing so, we have created everything from IO doctrine to IO organizations to IO training blocks of PME, all independent of air and space operations. Unfortunately, "add-on" IO can work for only some of its mission areas. For example, we can (and should) develop and organize NW capabilities separately, at least until they attain a certain level of maturity and prove fit enough to integrate with other air and space power capabilities for combined operations.[34] However, portions of IO—specifically, those within the influence-operations mission area—will never be effective if developed or employed independently. Influence operations (or the effects achieved within the cognitive domain) represent the impetus for all operations and thus must become an integral part of every capability (whether kinetic or nonkinetic) and the basis for how all operators approach mission planning and execution. Every effect of every objective of every strategy supports an end state that aims at affecting the cognitive domain. As Lt Gen Robert Elder recently stated, "Operations ultimately seek to influence behaviors so we can achieve our objectives at the operational and strategic (and even the tactical) levels."[35] While this article advocates separate planners who specialize in these arts, it does so in part because this principle has not yet

become an accepted and integral part of our culture. If we are to truly be successful in this mission area, it must become the bedrock of every step in force development, from institutional dogma to operational training—something we cannot achieve simply by adding another block of instruction to standing curricula. However, embracing such a philosophy requires a complete change in culture and a transformation of our foundational beliefs.

Conclusion

> *Information Warfare has become central to the way nations fight wars, and will be critical to Air Force operations in the 21st century. . . . We must invest in our people, planning, equipment, and research so our ambitions can become reality.*
>
> —*Cornerstones of Information Warfare*, 1997

Experts agree that the future of warfare is changing and that our ability to execute IO effectively remains critical to our success on the battlefields of the twenty-first century. Over the past several years, leadership has called for development of a career force that will lead us into this arena. Unfortunately, we have struggled even to define IO, much less determine what forces we need to answer this call. Seen in an operational light, our analysis has identified several gaps in both capability and career field that we must address. These gaps not only hinder our ability to advance IO and its mission areas but also, if the epigraph above is to be believed, threaten the very security of our nation. The recommendations provided here represent one solution. Do they give us the entire answer? No, but they offer a starting point for discussion and a vision to strive for. ❑

Notes

1. *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, 30 September 2001), 38, http://www.defenselink.mil/pubs/qdr2001.pdf.

2. *Defense Planning Guidance, 2004–2009* (Washington, DC: Office of the Secretary of Defense, May 2002), 36. Secret/NOFORN. Information extracted is unclassified.

3. *Information Operations Roadmap* (Washington, DC: Department of Defense, 30 October 2003), 33, http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB177/info_ops_roadmap.pdf. NOFORN.

4. *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, 6 February 2006), passim, http://www.defenselink.mil/pubs/pdfs/QDR20060203.pdf.

5. The Air Force is attempting to better organize its cyber forces. In late 2006, the chief of staff of the Air Force designated the commander of Eighth Air Force as the commander of the new Air Force Cyber Command, directing him to lead such forces and provide "combat ready forces trained and equipped to conduct sustained offensive and defensive [cyber] operations." AF/CC to 8AF/CC, memorandum, 1 November 2006.

6. For information on the B21 model, see Maj Timothy P. Franz, "IO Foundations to Cyberspace Operations: Analysis, Implementation Concept, and Way-Ahead for Network Warfare Forces" (master's thesis, Air Force Institute of Technology, March 2007), 7–29.

7. It is important to note that the terms *individual* and *mind* used here represent any decision maker, whether human or automated.

8. The three-domain concept is based on the original work of David S. Alberts et al., *Understanding Information Warfare* (Washington, DC: CCRP [Command and Control Research Program] Publication Series, 2001). This article uses a modification of the definitions in this work, as presented in Franz, "IO Foundations to Cyberspace Operations," 9–14.

9. For the definition of the term *operational domain*, see Franz, "IO Foundations to Cyberspace Operations," 14–17.

10. This definition is a modification of the one found in the "National Military Strategy for Cyber Operations," draft (Washington, DC: Chairman of the Joint Chiefs of Staff, November 2006), vii. Secret. Information extracted is unclassified. For the background of and justification for the modification, see Franz, "IO Foundations to Cyberspace Operations," 15–16.

11. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 5 January 2007), 529, http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf.

12. Ibid., 174.

13. Franz, "IO Foundations to Cyberspace Operations," 18.

14. JP 3-13, *Information Operations*, 13 February 2006, GL-9, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_13.pdf.

15. As defined in Department of Defense Directive (DODD) 3600.1, *Information Operations (IO)*, 14 August 2006, 1; JP 3-13, *Information Operations*, GL-9 and II-1 through II-9; AFDD 2-5, *Information Operations*, 11 January 2005, 1–25; Field Manual (FM) 3-13, *Information Operations: Doctrine, Tactics, Techniques, and Procedures*, 28 November 2003, 1-13, 1-14, 2-7, 2-8; and Navy Warfare Publication (NWP) 3-13, *Navy Information Operations*, 2003, 13, 14, and 2-6.

16. As defined in DODD 3600.1, *Information Operations (IO)*, 1-1; JP 3-13, *Information Operations*, GL-7 through GL-8; AFDD 2-5, *Information Operations*, 50; FM 3-13, *Information Operations*, 2-7; and NWP 3-13, *Navy Information Operations*, 13.

17. TSgt Austin Carter, "New Squadron Trains for Space-Based Aggression," 25 October 2000, http://www.spacedaily.com/news/milspace-00q.html.

18. Two items to note: (1) Classification restrictions prevent a more in-depth discussion of EW capabilities. However, understanding that organized, trained, and equipped EW capabilities do exist is sufficient to proceed for the purpose of this article. A detailed analysis that determines whether existing EW capabilities fulfill all of a combatant commander's needs is beyond the scope of this work. (2) The authors recognize that an overlap exists between the EW and NW mission areas since some NW capabilities may use EM energy to achieve their effects within the EM environment of cyberspace. Such capabilities are addressed under the NW section later in this article.

19. We use the terms *NetD* and *NetA* to be more in step with Air Force terminology. However, we do not restrict our analysis of these terms to Air Force doctrine but include the equivalent terms *CNA* and *CND*, found in DOD-, joint-, and other service-level doctrine.

20. As defined in DODD 3600.1, *Information Operations (IO)*, 1-1; JP 3-13, *Information Operations*, GL-5 through GL-6; AFDD 2-5, *Information Operations*, 53; and FM 3-13, *Information Operations*, 2-9 through 2-20. The US Navy uses the joint definition.

21. AFDD 2-5, *Information Operations*, 3. As mentioned earlier, we evaluate OPSEC separately although, doctrinally, it is still considered part of influence operations.

22. As defined in DODD 3600.1, *Information Operations (IO)*, I-2; JP 3-13, *Information Operations*, GL-10 through GL-11; AFDD 2-5, *Information Operations*, 52–54; FM 3-13, *Information Operations*, 2-3 and 2-6; and NWP 3-13, *Navy Information Operations*, 2003, 15.

23. Examples include the IO specialist (FA30) and the PSYOP specialist (FA39).

24. Maj Tadd Sholtis, "Public Affairs and Information Operations: A Strategy for Success," *Air and Space Power Journal* 19, no. 3 (Fall 2005): 97–106, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj05/fal05/fall05.pdf.

25. As defined in DODD 3600.1, *Information Operations (IO)*, 1-2; JP 3-13, *Information Operations*, GL-11; AFDD 2-5, *Information Operations*, 53–54; FM 3-13, *Information Operations*, 2-2; and NWP 3-13, *Navy Information Operations*, 15.

26. Air Force Policy Directive (AFPD) 10-11, *Operations Security*, 31 May 2001, 1, http://www.e-publishing.af.mil/pubfiles/af/10/afpd10-11/afpd10-11.pdf.

27. Air Force Instruction (AFI) 10-701, *Operations Security (OPSEC)*, 30 September 2005, http://www.e-publishing.af.mil/pubfiles/af/10/afi10-701/afi10-701.pdf.

28. The concept of of a "network class" is introduced in Franz, "IO Foundations to Cyberspace Operations," 67–69. Networks are organized under "classes" according to similar underlying technologies (e.g., hardware, common services, architectures, protocols, etc.).

29. Ibid.

30. Sholtis, "Public Affairs and Information Operations," 105.

31. Ibid.

32. Despite the fact that some experience will be beneficial at the higher levels, we do not believe that our analysis of the OPSEC mission area indicates the need for a dedicated career force at this time. In contrast, due to the mostly nontechnical nature of the mission area, we believe that it is more beneficial to cycle through personnel with different backgrounds and mission areas. Such diversity provides two benefits: (1) different backgrounds bring different ways of thinking, which is advantageous when it comes to this mission area, and (2) the more individuals exposed to OPSEC positions and then recast into their assigned career field, the more "OPSEC aware" the corporate Air Force becomes. For the technical aspects of MDVAs (e.g., network-penetration testing), it is recommended that each Red Team be supported by one or more NetA aggressor units. It is envisioned that such aggressor units, which do require a dedicated career force due to their technical nature, would be part of the NW forces discussed earlier.

33. *Quadrennial Defense Review Report* (2001), 38.

34. One finds a precedent in the development of early airpower. Air capabilities required time for independent growth and development before becoming mature enough to integrate with established land and sea capabilities.

35. Lt Gen Robert J. Elder Jr., "Effects-Based Operations: A Command Philosophy," *Air and Space Power Journal* 21, no. 1 (Spring 2007): 17, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj07/spr07/spr07.pdf.

Preferential Treatment for Military Members Based on Personality Type

1st Lt Ryan Kaiser, USAF

TELEVISION AND PRINTED news continually remind us of the cost of the global war on terrorism. The United States has assumed significant economic expense—witness the more than $379 billion allocated by Congress as of 29 September 2006 ($360 billion of which has already been spent as of 22 January 2007) for units operating in Iraq—and suffers the majority of the coalition's casualties.[1] In addition to the costs of war, military and political leaders have determined that in order for the United States to remain the world's only superpower, each military branch must have the most technologically advanced equipment available. As of April 2006, the total development and production cost of the Air Force's newest aircraft, the F-22 Raptor, amounted to over $70 billion—roughly $388 million per aircraft.[2] Because huge portions of the annual budget finance such technologies, the service must cut personnel and other costs. Consequently, Air Force members now find themselves trying to do more work with fewer people.

New Recruiting Techniques

Managers have long realized that they can reduce personnel costs by lowering expenditures for training and recruiting, especially by retaining active Air Force members. Obviously, recruiting people more likely to stay in the military for a long time would have the effect of increasing retention. By basing its recruiting efforts on testing for recognized, enduring traits such as personality and character types, the service could facilitate the process of identifying such individuals. Additionally, newly recruited members would probably stay longer if the Air Force allowed them to choose their career field. Therefore, in order to decrease personnel costs and ease the financial burden of war, the Air Force should give preferential treatment in recruitment and job placement to people whose personality type makes them likely to remain in service for an extended period of time.

Personality testing would simply provide a starting point for recruiting efforts by utilizing a narrower base to focus valuable time and resources. However, such testing would not eliminate candidates who lack the targeted personality traits. Because most recruiting efforts are not successful, military services have used everything from television commercials and race-car sponsorships to magazine ads and clothing campaigns to boost recruiting numbers. Moreover, a good deal of recruiting occurs at enlistment stations designed for people who wish to volunteer. To avoid any hint of favoritism, the Air Force should retain these methods, which carry no requirement of personality testing. Furthermore, by having trained professionals administer the tests or by commissioning a new test tailored to predict job satisfaction, the Air Force could eliminate other concerns about the process.

Assessment of a potential recruit's personality makes sense only if personality type and character are enduring traits that last the entire length of enlistment. A study by David Keirsey and Marilyn Bates found that personality changes

only slightly and that personality type remains consistent over one's adult life span.[3] Large, measurable changes do occur in the personality of children, probably due to the maturing process. Thus, the armed services vocational aptitude battery, administered during the second year of high school when students are 15 or 16 years old, represents an ideal means of testing the personality of potential recruits since personalities have stabilized by these ages.

If targeted recruiting could cut the number of Air Force recruiters by half, the savings would amount to roughly $785,500 per month or $9.4 million per year in recruiter pay alone, with much greater savings possible since an increase in personnel retention would reduce the amount of training. Additionally, this situation would create a more experienced Air Force, requiring fewer people to do the same amount of work. Increased efficiency and improvement in the overall quality of work would lead to even more savings.

Potential Problems

Despite the advantages of targeted recruiting, the public might consider mandatory personality tests an invasion of privacy. Even the scientific community, which supports personality testing, would object unless the Air Force uses professionals to administer the tests or tailors them more towards job satisfaction. Any personality test designed to identify good military recruits would have to be given to a large number of individuals shortly before they become eligible for enlistment. Since most high school students do not pursue a career in the military, however, doing so would subject them to a test from which they would derive no benefit. Finally, the service must take into account any ethical concerns about a personality test's validity across all subject groups. For example, many types of testing, including the American College Test and the Scholastic Aptitude Test, have come under scrutiny since they show regional and ethnic inconsistencies. Although some critics might oppose the use of tests to recruit new military members, strong evidence suggests that properly organized instruments would meet the Air Force's goals.

As for the issue of privacy, schools already subject students to ability and aptitude tests that measure them against their peers on school, state, and national levels. Every year, students take national standardized tests that evaluate them on everything related to academics, a process that also measures schools' ability to teach their students. Administering personality tests concurrently with the armed services vocational aptitude battery would give students insight into the types of work most suitable for them. No doubt the additional test would raise privacy issues—but no more than those concerning any other aptitude test already conducted. Furthermore, one should weigh any such liability against the test's usefulness to students interested in choosing careers.

Lastly, validity always becomes a major concern when one designs personality assessments—especially those that facilitate job placement. The Keirsey-Bates test, introduced in 1978, has subsequently gone through several revisions. Similarly, the Myers-Briggs test and the Minnesota Multiphasic Personality Inventory, conceived during World War II, have undergone a number of changes to enhance their accuracy, reliability, and validity.[4] Further, the five significant personality traits—openness to experience, conscientiousness, neuroticism, agreeableness, and extraversion—emerged from a meta-analysis of personality traits and their correlation to job performance. The scrutiny to which these tests have been subjected and the refinement they have undergone to improve their assessment capabilities should alleviate any concerns about their validity.

Feasibility

Considerable evidence points to the benefits of using personality testing in military recruitment and job placement. The military has used tests such as the Woodworth Personal data sheet since 1919 to predict a recruit's susceptibility to shell shock and administered the Thematic Apperception Test in the 1930s to identify personalities susceptible to enemy

intelligence. Currently the Keirsey temperament sorter categorizes people into 16 different personality types that strongly correlate with the Myers-Briggs test; it also associates occupations with each type. Using this test for military job placement may be as easy as identifying temperaments most suitable for specific jobs and simply matching recruits with those jobs. To test this theory, the Air Force could conduct a latitudinal study of a large, representative cross-section of the entire military; generalize the results to the Air Force; and adjust recruiting methods accordingly—all in less than a year. Study participants would take a test to determine their personality group, and evaluators would then compare the different groups to determine each one's retention rate based on time-in-service data.

As America continues to send troops to the far reaches of the globe in an effort to stabilize the Middle East and promote democracy in the rest of the world, US taxpayers are left paying the bill. The men and women in our military services feel the pain of budgetary constraints. Air Force decision makers have elected to deal with this situation by reducing personnel costs. This article has suggested that the Air Force can realize substantial savings by increasing personnel retention—specifically by giving people with a particular personality type preferential treatment in job placement and recruiting efforts. Targeted recruiting can save the Air Force money by lowering spending on recruiting efforts, reducing the amount of training, and increasing the service's efficiency and experience. Overall, this proposal seeks to lower personnel costs of the Air Force and other military services so they can continue to fund research, development, and procurement of new, state-of-the-art equipment such as the F-22. New and improved equipment will ensure that the United States remains a superpower and will enable our military forces to continue to fight the global war on terrorism. ❑

Notes

1. *Wikipedia: The Free Encyclopedia*, s.v. "Iraq War," http://en.wikipedia.org/wiki/Iraq_war (accessed 15 December 2006).

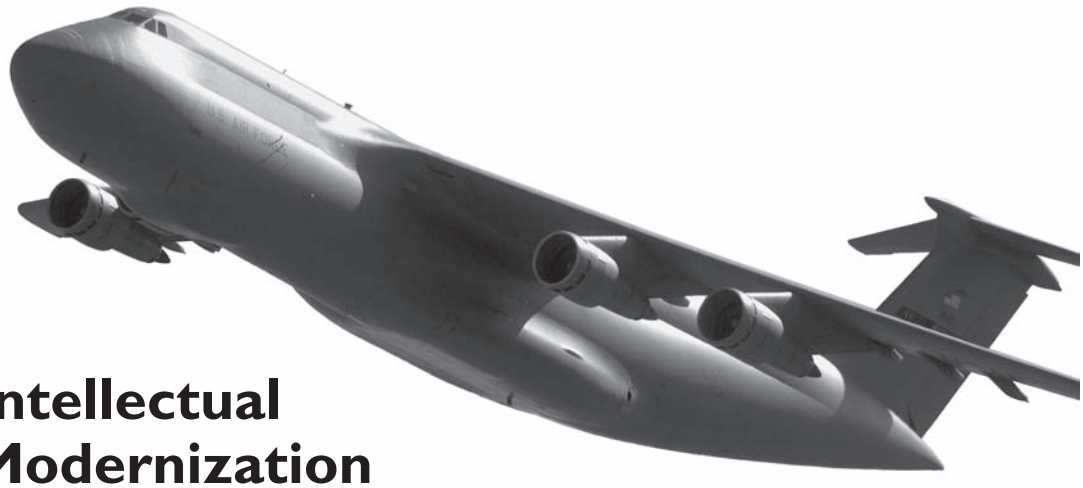
2. *Wikipedia: The Free Encyclopedia*, s.v. "F-22 Raptor," http://en.wikipedia.org/wiki/F22 (accessed 15 December 2006).

3. David Keirsey and Marilyn Bates, *Please Understand Me: Character and Temperament Types*, 5th ed. (Del Mar, CA: Prometheus Nemesis Book Company, 1984), 2–4.

4. *Wikipedia: The Free Encyclopedia*, s.v. "Myers-Briggs Type Indicator," http://en.wikipedia.org/wiki/Myers-Briggs_Type_Indicator (accessed 15 December 2006).

Through technological advances and Airmen's ingenuity, we can now surveil or strike any target anywhere on the face of the earth, day or night, in any weather.

—Gen T. Michael Moseley, Chief of Staff, USAF



Intellectual Modernization of the C-5

Making the Galaxy Expeditionary

COL MARK C. "MARSHAL" DILLON, USAF

Editorial Abstract: Recalling a 41-year-old admonition to "revolutionize global mobility airlift," the author says that now is the time to begin such a revolution—and fulfill current efforts to "transform" the military—by routinely deploying the C-5 Galaxy in an expeditionary role. This article highlights the Galaxy's capabilities, counters negative claims about its reliability, and proposes changes in doctrine, organization, training, leadership, personnel, and facilities that will help modernize the aircraft (although it does not attempt a technical discussion of those facilities).

Let us not attempt to reconcile contradictions, but firmly embrace a rational alternative.

—Alexander Hamilton
The Federalist, no. 23

THE TIME HAS come for the Air Force to deploy the C-5 Galaxy routinely in an expeditionary role. Recent experience suggests that forward-deployed C-5 operations have become the rule rather than the exception and should be codified into expeditionary doctrine.[1] This doctrine or "intellectual modernization" complements ongoing mechanical upgrades via the avionics modernization program (AMP) and the reliability enhancement and reengining program (RERP). Furthermore, by mitigating the C-5's Achilles' heel—poor mission-capable (MC) or reliability rates—the AMP and RERP should give Air Force leaders additional confidence to deploy the Galaxy routinely. Guidance from Department of Defense and Air Force leadership is clear: now is the time to change.

Challenging the military to transform, former secretary of defense Donald Rumsfeld opened his *Transformation Planning Guidance* of April 2003 by remarking, "As we prepare for

the future, *we must think differently* and develop the kinds of forces and capabilities that can adapt quickly to new challenges and to unexpected circumstances. *We must transform not only the capabilities at our disposal, but also the way we think, the way we train, the way we exercise and the way we fight*" (emphasis added).[2] Likewise in the Air Force's posture statement for 2006, Secretary of the Air Force Michael W. Wynne and Chief of Staff of the Air Force Gen T. Michael Moseley challenge Airmen to "look from their heritage to the horizon, taking lessons from the past and adapting them for the future."[3]

Using these strategic imperatives for change as a guide, this article seeks to begin a discussion about intellectual modernization of the C-5. First, it highlights the aircraft's unique capabilities, citing its early combat employment to trace its expeditionary doctrine back to the 1960s. Next, it shows that despite the C-5's reputation as mechanically temperamental, the label of unreliability (and thus of limited use in expeditionary operations) is not necessarily justified. In addition, expeditionary and expeditionary-like employments (both combat and noncombat) make a compelling case for routine deployment. Finally, to round out the discussion regarding intellectual modernization, this article proposes changes not only to doctrine but also to organization, training, material, leadership, personnel, and facilities.[4]

To narrow the discussion, it makes three assumptions. First, we must continue to use the C-5 as a combat asset. This follows the second tenet of Pres. Ronald Reagan's directive on US airlift policy in 1987: "The role of the military component of the airlift fleet is to do what commercial transport aircraft or civilian aircrews cannot or will not do."[5] Second, studies indicate that a modernized C-5M will increase reliability and provide a more capable airplane.[6] Finally, this article does not pit C-5s against C-17s. The Air Force will operate both platforms for decades to come. (Current programming projects at least 50 C-5Ms in the Mobility Requirements Study of 2005 and the Quadrennial Defense Review of 2006.)[7] Rather than placing modern combat-airlift aircraft in competition with each other, this article leverages their strengths in order to exploit the capabilities of the C-5.

Impressive Capabilities

The bottom line was that if the airplane [C-5] lived up to its expectations, "global military airlift will be completely revolutionized."

—Lt Col Charles E. Miller
Airlift Doctrine

During the same decade that America sent men to the moon and returned them safely, Lockheed engineers built the C-5 Galaxy, the United States' largest and heaviest military-airlift jet.[8] For three decades, US leaders have often reached for the C-5 in their force-projection quiver. In light of its reputation for maintenance problems (some anecdotal, some legitimate), however, they have often hesitated to employ this tremendous national asset and its unique capabilities.

In terms of cargo capacity—both volume and total weight—the C-5 has no equal.[9] With room for 36 standard 463L pallets, it carries twice as many as the C-17 (18), nearly three times as many as the C-141 (13), and six times as many as the C-130 (6).[10] Furthermore, it can simultaneously transport up to 95 aircrew members and passengers combined (20 in the upper flight deck and 75 in the upper-aft troop compartment). Just as impressive is the total cargo weight. The C-5 can carry 291,000 pounds compared to 167,000 for the C-17; 68,725 for the C-141; and 40,000 for the C-130.[11]

Designed for forward operations, the C-5 boasts such features as the use of nitrogen to render vapor in the wing fuel tanks inert and other firefighting capabilities throughout the aircraft, which make it highly survivable. Because it can load/unload through fully opening doors in both the nose and aft portion of the aircraft, it requires little or no ground-support equipment.[12] Moreover, its high-flotation landing gear enables it to operate on unimproved surfaces (including ice). In fact, the C-5 applies less stress to runways and taxiways than any other US airlifter.[13]

The Galaxy's payload and range are also impressive. It can carry everything in the US

defense arsenal, including battle-ready tanks, helicopters, submarines, boats, and the massive 74-ton mobile scissor bridge. A fuel capacity of 332,500 pounds contained in the wings (over 51,000 gallons) contributes to its long range and enables forward ground refueling. For example, a C-5 with a cargo load of 270,000 pounds can fly 2,150 nautical miles, off-load, and fly to a second base 500 nautical miles away from the original destination—all without aerial refueling. With aerial refueling, only crew endurance limits the aircraft's range.[14] As the United States adjusts its global defense posture, the combination of the C-5's range and payload remains a vital force-projection capability.[15]

The aircraft can also perform airdrops. On 7 June 1989, a single C-5 air-dropped paratroopers and equipment totaling 190,346 pounds—still a world record.[16] In the decade that followed, the Air Force halted the C-5 airdrop program. According to the service's "Heritage to Horizons" posture statement of 2006, which suggests taking lessons from the past and adapting them to the future, an airdrop-capable C-5 could augment current or emerging airdrop requirements.[17] An array of combat-airlift capabilities resides in the C-5. Soon after the Galaxy became operational, world events tested these capabilities and shaped early employment doctrine.

Teaching an Old Dog New Tricks

There is nothing new. . . . The new is the history you didn't read.

—Pres. Harry S. Truman

The idea of forward-deploying the C-5 originated before the giant airlifter became operational. Secretary of the Air Force Harold Brown lay the groundwork for this doctrine in the mid-1960s, stressing his willingness "to commit publicly to the idea of having both the C-141 and C-5 deliver directly to forward logistics bases rather than main ones in the rear if the landing zones could handle them."[18] These forward-deployed operations, albeit not conducted on a routine basis, nonetheless established the foundation for today's C-5 combat missions in Afghanistan and Iraq.

On 3 May 1972, two years after taking possession of its first operational C-5, Military Airlift Command (MAC) completed the first three of 18 C-5 combat sorties into Vietnam. To counter North Vietnam's Easter Offensive of 1972, Gen Creighton Abrams Jr., commander of Military Assistance Command, Vietnam, requested the emergency airlift of six MK-48 tanks from Yokota Air Base, Japan, to Da Nang Air Base, South Vietnam.[19] Demonstrating MAC's intertheater airlift doctrine—rapid deployment of combat forces—the six tanks were off-loaded in less than seven minutes and proceeded from the airfield directly into combat. Building on this success, 15 additional C-5 combat missions to Da Nang and Cam Ranh Bay—averaging off-load times of just 32 minutes each—delivered 42 M-41 tanks and eight M-548 tracked vehicles.[20]

Gen Howell Estes Jr., commander in chief of MAC (CINCMAC) from 1964 to 1969 and the genius behind this unconventional C-5 employment, identified flexibility as the most significant principle of war in the modern era, stating that throughout the Cold War, global airlift had given the United States maximum flexibility.[21] Building on this theme, General Estes later wrote that "the role of modern combat airlift, then, is to airlift combat forces and all their battle equipment, in the size and mix required—with the greatest speed—to any point in the world, no matter how remote or primitive, where a threat arises or is likely to erupt."[22]

On 14 October 1973, a C-5 carrying 186,200 pounds of cargo landed at Tel Aviv's Lod International Airport. Highlighting rapid global mobility and the flexibility of modern combat airlift (as well as putting the aircraft at risk from potential terrorists and missile attacks), this C-5 landed just nine hours after Pres. Richard Nixon gave the order for the United States to send military supplies to Israel. It thus completed the first mission of a combined C-141/C-5 airlift called Operation Nickel Grass.[23] In 32 days of Nickel Grass, this combination of aircraft posted some impressive statistics, but the political results proved even more impres-

sive, as reflected in Israeli prime minister Golda Meir's statement that "for generations to come, all will be told of the miracle of the immense planes from the United States bringing in the materiel that meant life to our people."[24]

These two operations validated Secretary Brown's construct of putting large jet aircraft forward, demonstrating that under certain conditions—or, as the secretary stated, "if the landing zones could handle them" (see above)—then the C-5 could and should be used. Although much has changed since the early forward deployments of this aircraft, one constant remains—poor MC or reliability rates.

Reliability: The Galaxy's Achilles' Heel

People, ideas, hardware . . . in that order.

—Col John R. Boyd, USAF

Pushing technology of the 1960s to the limit presented Lockheed engineers with an enormous challenge. For example, each C-5 contains over 90,000 parts—the equivalent of four F-16s. As if to portend the future, when Gen Jack J. Catton, CINCMAC, landed the first operational C-5A on 6 June 1970, a wheel from the left landing gear separated from the airplane and bounced down the runway.[25] Likewise, personnel in Israel had to unload all 186,000 pounds of cargo from Nickel Grass's first C-5 by hand because the crucial materiel-handling equipment and aerial porters were on board a second C-5 that had diverted for maintenance.[26]

The MC rate for the C-5 fleet has always hovered around 65 percent—well below the required 75 percent during wartime.[27] In the past, the Air Force has focused on single-system modifications that have yielded marginal increases in MC rates.[28] Critics argue that the AMP and RERP represent more of the same. However, as noted in an article titled "Saving the Galaxy," the more comprehensive AMP and RERP programs may finally solve a majority of the Galaxy's mechanical woes.[29]

No doubt the C-5 is difficult to maintain; however, prior to the multibillion-dollar investment in the AMP and RERP, C-5s had achieved noteworthy MC rates. The next section captures the aircraft's recent mission (as well as maintenance) success in forward-deployed operations, casting doubt on the notion of poor rates as the sole barrier to future deployments.

Recent Developments

At a White House National Security Council meeting on 28 September 2001 as President Bush considered Afghanistan military options following the 9/11/01 attacks, Secretary of Defense Donald Rumsfeld stated, "There's an Uzbek airport eight to 10 miles from the main airport. We're going to send in our assessment team, we're going to see if the airstrip can accommodate C-5s."

—Bob Woodward
Bush at War

Today, scores of successful C-5 combat missions into Afghanistan and Iraq trace their roots to Secretary Brown's original forward-deployment construct: "[C-5s] deliver directly to forward logistics bases rather than main ones" (see above). Modeled after previous C-130 and C-17 expeditionary airlift squadron (EAS) deployments, the successful C-5 EAS in July of 2002 in support of Operation Enduring Freedom marked a historic "first" for the aircraft (note the late entry of the C-5 into a truly deployed expeditionary role).[30] It was not the fact that C-5s flew into combat or into the bomb-cratered, night-only runway in Kandahar, Afghanistan, that made history. Nor was it the 782nd EAS's launching of 100 percent of these sorties (26) on time to extract the Princess Patricia's Canadian Light Infantry Regiment six days (25 percent) ahead of schedule. Rather, this represented the first-ever expeditionary deployment of a C-5 squadron in a combat theater with a complete support-and-command structure.[31] Pentagon after-action briefings to the secretary of the Air Force and Air Force Council in December 2002 confirmed the expeditionary capability of the C-5. Secretary James Roche summed up the operation by saying, "You all did a magnificent job

on your first ever combat deployment."[32] Immediately afterward, in August 2002, Air Mobility Command (AMC) deployed its second C-5 EAS, which extended the string of on-time departures by 15 more sorties to the even shorter, narrower, daytime-only (for construction) Kandahar airfield.[33]

Noncombat operations can also help shape new expeditionary doctrine for the C-5. Options such as backup aircrews/aircraft, highly qualified aircrews, and forward-deployed leadership contribute to the success of Phoenix Banner—AMC's highest-priority airlift mission (presidential support).[34] Even before EAS deployments became commonplace, the author witnessed the utility of forward or expeditionary-like employment of leadership, crews, and maintenance. For example, in the year 2000, AMC successfully merged hundreds of C-17, C-5, and air-refueling missions to safely move the US president's support staff to India (in support of the Asia-Pacific Economic Conference).

Forward deployment has also proved valuable in training and readiness exercises. In mid-2001 the author deployed C-5s (and C-141s) stateside in an expeditionary operational readiness inspection. In fewer than five days, this expeditionary wing not only deployed and then redeployed itself but also launched all C-141 and C-5 missions on time—many in a simulated chemical environment. These noncombat, expeditionary-like employments further demonstrate that it is time to rewrite our doctrine and make C-5 expeditionary operations routine.

An Argument for Change

> *It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.*
>
> —Niccolò Machiavelli
> *The Prince*

Other aging, Cold War legacy systems have modified their doctrine—the B-52 Stratofortress and KC-135 Stratotanker, for example. Adopting technology to war fighting, the Air Force transformed the B-52 into a platform capable of delivering nuclear and conventional weapons via the global positioning system, upgraded its guidance technology, and wrote new doctrine for the aircraft. Substituting precision for mass, B-52s evolved from carpet-bombing into successful close-air-support platforms that caught the world's attention during Enduring Freedom. America continues to rely heavily on this aircraft.

Likewise, the KC-135 underwent a modernization program similar to the C-5's AMP and RERP. The R-model conversion program centered on new engines and avionics for the 1950s-era tanker, and, as occurred with the B-52, Airmen transformed doctrine for the KC-135, whose Cold War mission involved a garrisoned nuclear-alert force, a refueling-only tasking, and "hard" crews (including navigators).[35] After the Cold War, its doctrine changed to include expeditionary forward-deployed forces, a new cargo (roller) mission, mixed crews, and a reduced crew complement (replacing navigators with new avionics). KC-135s flying over Baghdad's surface-to-air-missile engagement zones fewer than two weeks into Operation Iraqi Freedom touted part of the doctrinal evolution.

The B-52 and KC-135 examples illustrate a precedent for modernizing doctrine along with platforms. Incorporating C-5 employment into expeditionary doctrine constitutes one intellectual-modernization proposal for this aircraft. In order to capture the rest, the remainder of this article utilizes the Joint Staff's capabilities template for doctrine, organization, training, materiel, leadership and education, and personnel (deliberately excluding changes to facilities).

Doctrine

In light of transformation and expeditionary strategic imperatives, the recent success of forward deployments makes traditional C-5 "stage" operations ripe for change. (A traditional airlift stage, with pre-positioning of aircrews at key airfields around the globe, resembles the US Mail Service's Pony Express, in operation from 1860 to 1862. That is, when an aircraft lands, fresh aircrews stage or swap—just as

Pony Express riders swapped horses—to keep the aircraft moving to a destination or back to the pickup point.)[36] Though efficient at moving forces during large operations, staging has experienced some shortfalls.

Aircrew anecdotes criticizing stage operations are legendary. However, the real impact lies at the strategic level, especially for a long war. First, as mobilization authority for the Reserve and Air National Guard (which make up the majority of the C-5's crew force) runs out, the Air Force must find ways to prosecute the global war on terrorism while efficiently managing a limited crew force. Aware of this situation across his command, Gen Duncan McNabb, commander of AMC, is "pushing for a number of reforms, in-house and in conjunction with US Transportation Command," to adjust AMC's high operations tempo. According to the general, " 'That mobilization authority is starting to run out' . . . so AMC must 'get to the point where we can do this steady state.' "[37] During the "long war," C-5 aircrews have spent as much time away from home as fellow Airmen (in increments of 14–30 days) but do not receive credit as part of an air and space expeditionary force (AEF). In 2002 and 2003, C-5 pilots were away from home longer than any other AMC pilots.[38] During this same period, less than 10 percent ever approached the Air Force's mandated 90-day flying-hour maximums.[39]

Second, since C-5 crews are enablers, they do not qualify for AEF advantages of predictability, training priority, and guaranteed postdeployment downtime. Although not considered as "tactical" as the C-130 or C-17, C-5s nonetheless routinely operate in the Iraqi and Afghani combat zones. Unlike C-130 or C-17 crews, however, in the traditional stage paradigm, C-5 crews are sent into combat by a stage manager—not a commander. A recent deployment of C-17 aircrews (and a squadron commander) in Southwest Asia highlights the manifold benefits of deploying aircrews versus

C-5

staging. The C-17 EAS commander stated that " 'this way of operating [deploying] gives both the combatant commander as well as the aircrews the continuity needed to improve reliability and efficiency. Aircrews get accustomed to the combat environment and users get accustomed to the crew and squadron leadership. It's a win for everyone.' " Moreover, this deployment reduced required aircrews by up to 50 percent.[40]

To meet the demands of a long war, revised C-5 expeditionary doctrine focuses on improving mission success—but could produce improved aircrew efficiency as a by-product. For example, a complete EAS (commander and aircrews) would deploy to an existing C-5 stage location for 90–120 days and fly sorties to/from the Iraqi and Afghani combat zones (or where directed in-theater). Nondeployed C-5 crews shuttle passengers and cargo from the United States to the EAS location and back—a mission for demobilized Reserve, National Guard, and nondeployed active duty crews. As the C-5 EAS matures, C-5 Reserve and National Guard crews could assume more taskings—as have their combat Air Force counterparts. How many additional truck convoys could we remove from the hostile roads of Iraq and Afghanistan if we forward-deployed C-5s routinely?

We should consider one other doctrinal consideration: could the Air Force use a modernized C-5M for airdrop? Taxpayers must expect more from their $8 billion AMP and RERP investment, and the Air Force should demand even more from a modernized C-5M. The C-5 would certainly not become the Air Force's primary airdrop platform, but the service might wish to consider the Galaxy's ability to air-drop heavy equipment as one option for meeting current and emerging requirements for such delivery and force projection. The challenges of a long war put an ever-increasing premium on the current combat airlift fleet and thus demand that doctrine evolve to keep pace.

Organization

We should deploy C-5 aircrews under the AEF construct as an EAS to existing stage locations (see doctrine above). Three- and six-ship C-5 unit type codes exist and have been exercised. Critics may argue that this will put C-5 aircrews in the same deployment spiral that C-130 crews experience; however, C-5s have a much higher crew ratio than do C-130s. Moreover, the EAS conforms with General Moseley's most recent Heritage to Horizons priorities. Under his first priority, "Prosecute the Long War on Terrorism," applicable tier-two initiatives that align with C-5 intellectual modernization include the following: "align garrison organizational template with expeditionary template, align [unit type codes] to minimize non-unit deployments, ensure 100% of uniformed members are in AEF deployment bucket."[41] Airmen comprising C-5 aircrews aren't the only ones to benefit from this initiative (see stage managers, expeditors, and ramp supervisors in the section on "Leadership and Education," below).

Another recommendation calls for attaching maintenance units to deploying C-5 flying squadrons—especially for the mechanically temperamental Galaxy. "Combat Wing Organization," a "Chief's Sight Picture" from Gen John Jumper, former Air Force chief of staff, reiterates this construct:

> When I was a squadron commander there was an Aircraft Maintenance Unit (AMU) attached to my squadron. I didn't command the AMU. The officer in charge of the AMU was trained by the colonel who ran the maintenance organization. This colonel had been in the business of maintaining airplanes for 24 years. When the squadron deployed, there was no doubt that the AMU would come under my command. But that AMU had been trained by someone who knew the fixing business as well as I knew the flying business.[42]

Training

C-5 training challenges include developing a weapons instructor course (WIC), moving the formal training unit (FTU), incorporating maintenance success, and evaluating mission readiness. Intellectual modernization puts establishing a C-5 WIC at the forefront. This course serves as the Air Force model for insti-

tutionalizing tactics, techniques, and procedures (TTP)—turning combat lessons identified into lessons learned. TTP continuity previously maintained by the C-5 special-operations community (eliminated in 2003) now has no formal home to institutionalize combat lessons learned. Nonetheless, C-5 aircrews' ability to safely execute tactical approaches/departures, integrate night vision devices, swiftly conduct engine-running on- and off-loads, and survive a surface-to-air-missile strike proves that today's C-5 crews are more than ready to embrace the intratheater or tactical combat-airlift role.[43] If current TTPs and training profiles are any indication, the C-5 still lags behind current needs. As of the summer of 2006, C-5 annual refresher training still did not include Afghani or Iraqi databases or require combat entry and exit profiles.

In fiscal year 2007, the Air Force's C-5 FTU moves from Altus AFB, Oklahoma, to an Air Force Reserve Command unit at Lackland AFB's Kelly Field, Texas. Ensuring that this transfer goes smoothly despite a host of challenges will require keen oversight. Challenges include having a combat-coded unit assume the training mission with no assigned training-coded aircraft and smoothly transferring the recently modernized combat mobility training.[44] All of these events must occur in parallel with the AMP, RERP, and ongoing operations in Iraq and Afghanistan.

Unlike earlier vignettes that showed success with the short-term MC rate, the C-5 FTU at Altus has experienced success with the long-term rate in an environment that parallels expeditionary operations. The 97th Maintenance Directorate at Altus—the recent Air Force MC rate champion—delivered rates of 70.4 and 73.3 percent for 2004 and 2005, respectively.[45] This unit overcame challenges applicable to expeditionary operations: a small number of assigned aircraft (eight of some of the oldest C-5As), a demanding training mission (multiple landings and/or air refuelings per sortie), and a lower parts-supply priority (force/activity designator code) than the rest of their C-5 brethren.[46] During the same period, the 97th flew dozens of sorties in support of Iraqi Freedom and recovery operations associated with hurricanes Katrina, Rita, and Wilma. Despite the FTU transfer from Altus to Kelly, mentioned earlier, we still have an opportunity to capture and formalize the 97th's success. Spreading these near-wartime MC rates will not only boost Kelly's C-5 availability (by increasing the historic rates up to 20 percent) but also significantly lift Air Force–wide availability of the Galaxy—regardless of the AMP and RERP.[47] Finally, as former secretary Rumsfeld stated, "We must transform . . . the way we exercise and the way we fight" (see above); therefore, as the C-5 transforms its doctrine, expeditionary operational readiness inspections must continue to serve as the C-5 readiness training and evaluation tool.

Materiel

Since the AMP and RERP are evolutionary materiel upgrades, intellectual modernization poses revolutionary proposals for a modernized C-5M. Could evolutions used in other airlifters—night vision devices or head-up displays—coupled with the RERP's quieter engines and 20 percent thrust increase constitute a revolution in itself by significantly enhancing the C-5M's global access? Other examples include reducing the C-5's aircrew complements (see the section on "Personnel," below), adding airdrop capability that incorporates the Joint Precision Airdrop System, and improving ground maneuver by using RERP engines to back up the C-5 (currently an emergency procedure).[48] Although these items certainly do not represent an extensive list, the potential for high payoff with minimum cost makes them possible topics for the Air Mobility Battle Lab.[49]

Leadership and Education

As the section on "Doctrine" recommended, intellectual modernization of the C-5 routinely deploys squadron commanders to lead expeditionary units. In the traditional C-5 stage, we forward-deploy stage managers and other specialists to help solve specific problems. These stovepipes of leadership include expediters (senior flight engineers who assist with aircraft-equipment waivers) and ramp supervisors. But we really need squadron com-

manders—people who not only manage, expedite, and supervise the mission but also standardize tactics, intelligence, and operations between downrange airfields; apply operational risk management; judiciously apply scarce resources (crews, maintenance, and aerial port); and, because they know their unit members better than nondeployed commanders, actually improve unit cohesion/morale.[50] In today's expeditionary and combat environment, forward-deployed squadron commanders provide much simpler decentralized execution than stage managers, expediters, and ramp supervisors. (The fact that the Air Force has institutionalized expeditionary operations into all of its force development eliminates the need for any educational recommendations.)

Personnel

In a letter to Airmen, Secretary of the Air Force Wynne says that "we will look at innovative ways to use our materiel and personnel more efficiently."[51] As technology continues to reduce the pilot's preflight workload, the Air Force may look at reducing the C-5's crew complement by eliminating the third loadmaster position and the flight engineer. At the outset of Iraqi Freedom, C-5s routinely and safely operated on augmented duty days (or at maximum crew-duty period) with two loadmasters instead of the usual three. Using only two loadmasters should not require additional technology but would necessitate retraining. Like C-17 pilots, C-5 pilots could assume some of the ground duties for which current C-5 enlisted crew members (loadmasters and/or engineers) are responsible. This brings us to a second personnel recommendation—flight engineers.

Using technology available today, other aircraft (the civilian DC-10 to MD-11 conversion or the C-130J model) have replaced their flight-engineer position. Obviously, without redesigning the C-5, the Air Force cannot eliminate the second flight engineer or "scanner" crew position. Nonetheless, we now have the technology to do without the C-5's flight engineer. In the environment of Air Force Smart Operations 21, cost-effectiveness will dictate such changes.

Conclusion

> *Thinking about airlift means thinking about combat. . . . Any activity that does not contribute to this philosophy, any attitude that does not reflect a preparation for the combat airlift mission, any doctrine that does not serve that end is suspect and dangerous.*
>
> —Lt Col Charles E. Miller
> *Airlift Doctrine*

As mentioned earlier, the idea of forward-deploying the C-5 is older than the aircraft itself. Recent events—US military transformation, an expeditionary focus, and successful deployments of the C-5—suggest that we should revisit this concept. Intellectually modernizing the C-5 to make expeditionary deployments routine should occur even during mechanical upgrades of the AMP and RERP. Although we have always had concerns about the C-5's reliability, as several examples illustrate, maintainability and, ultimately, the aircraft's mission success can be affected as much by employment and/or training as by mechanical means. Although this article's recommendations remain incomplete and subject to debate, they nonetheless offer a starting place for discussion about the expeditionary C-5, which we need if we wish to improve combat capability—today and tomorrow. Done right, a modernized and expeditionary C-5 may finally "revolutionize global mobility airlift," as former CINCMAC General Estes predicted in 1966.[52] ❑

Notes

1. "Air and space doctrine is an accumulation of knowledge gained primarily from the study and analysis of experience, which may include actual combat or contingency operations, as well as experiments or exercises." Air Force Doctrine Document 1, *Air Force Basic Doctrine*, 17 November 2003, ix, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd1.pdf.

2. *Transformation Planning Guidance* (Washington, DC: Department of Defense, April 2003), 1, http://library.nps.navy.mil/uhtbin/cgisirsi/Mon+Nov+13+12:37:04+PST+2006/SIRSI/0/520/TPGfinal.pdf.

3. SrA J. G. Buzanowski, "Air Force Releases 2006 Posture Statement," Air Force Print News, 2 March 2006, http://www.af.mil/news/story.asp?id=123016812.

4. *JCIDS [Joint Capabilities Integration and Development System] Overview* (Washington, DC: Joint Staff, J-8 Capabilities and Acquisition Division, n.d.), http://www.dodccrp.org/iamwg/archive/02_20_04_JCIDS.ppt.

5. Lt Col Robert C. Owen, "The Airlift *System*: A Primer," *Airpower Journal* 9, no. 3 (Fall 1995): 25.

6. John A. Tirpak, "Saving the Galaxy," *Air Force Magazine* 87, no. 1 (January 2004): 35, http://www.afa.org/magazine/jan2004/0104galaxy.asp.

7. Briefing, Air Force Requirements Council, subject: Air Mobility Command Outsize and Oversize Analysis of Alternatives, 2 December 1999; and *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, 6 February 2006), 54, http://www.comw.org/qdr/qdr2006.pdf.

8. Dr. John W. Leland and Kathryn A. Wilcoxson, *The Chronological History of the C-5 Galaxy* (Scott AFB, IL: History Office, Air Mobility Command, 2003), 1. The C-5 Galaxy was the world's largest and heaviest aircraft from its first flight in 1968 until 1982, when the Soviet Antonov An-124 captured this title. Like the C-141 Starlifter, also manufactured by Lockheed Aircraft Corporation, the C-5 has a high T-tail, a 25-degree wing sweep, and four turbofan engines.

9. For definitions of the terms *palletized*, *oversized*, and *outsized cargo*, see Air Mobility Command Instruction 24-101, *Transportation*, 13 February 2004.

10. "The 463L Master Pallet System is the main device used for air transport by the United States Air Force. All cargo aircraft used by the [USAF] are configured to accept these pallets. Its dimensions are 88"W, 108"L, and 2 1/2"H. The usable space is 84 [inches] by 104 [inches]. It can hold up to 10,000 lb of cargo at 8 G's. The empty weight is 290 lb." *Wikipedia: The Free Encyclopedia*, s.v. "463L Master Pallet," http://en.wikipedia.org/wiki/463L_master_pallet.

11. Leland and Wilcoxson, *Chronological History*, 1.

12. Kneeling (raising and lowering) the entire aircraft approximately three feet to accommodate loading/unloading cargo and wheeled vehicles through its full-width opening front *and* rear doors is a feature unique to the C-5.

13. CMSgt Timothy Reuning, AMC/A3 7VG, interview by the author, 29 January 2004. Larger than a Boeing 747, the C-5 has 28 tires that help spread its weight. In fact at maximum gross weight, a C-5 has a lighter pavement classification number than a fully loaded C-141 or C-17.

14. "C-5 Galaxy," USAF fact sheet, http://www.af.mil/factsheets/factsheet.asp?id=84.

15. House, *Statement Prepared for Delivery to the House Armed Services Committee by Under Secretary of Defense for Policy Douglas J. Feith, Washington, DC*, 108th Cong., 2nd sess., 23 June 2004, http://www.defenselink.mil/speeches/2004/sp20040623-0522.html.

16. Leland and Wilcoxson, *Chronological History*, 62.

17. *Army Modernization Plan, 2003* (Washington, DC: Department of the Army, 13 March 2003), annex D, D-17, http://www.army.mil/features/MODPlan/2003/MP03Mainweb100.pdf.

18. Lt Col Charles E. Miller, *Airlift Doctrine* (Maxwell AFB, AL: Air University Press, March 1988), 305, http://aupress.au.af.mil/Books/Miller_Airlift/Miller_airlift.pdf.

19. Leland and Wilcoxson, *Chronological History*, 12.

20. Miller, *Airlift Doctrine*, 339.

21. Gen Howell M. Estes Jr., "The Revolution in Airlift," *Air University Review* 17, no. 3 (March–April 1966): 15.

22. Gen Howell M. Estes Jr., "Modern Combat Airlift," *Air University Review* 20, no. 6 (September–October 1969): 18, http://www.airpower.maxwell.af.mil/airchronicles/aureview/1969/sep-oct/estes.html.

23. Leland and Wilcoxson, *Chronological History*, 13.

24. Capt Chris J. Krisinger, "Operation Nickel Grass: Airlift in Support of National Policy," *Airpower Journal* 3, no. 1 (Spring 1989): 27, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj89/krisinger.html; and Walter J. Boyne, "Nickel Grass," *Air Force Magazine* 81, no. 12 (December 1998), http://www.afa.org/magazine/Dec1998/1298nickel_print.html.

25. Leland and Wilcoxson, *Chronological History*, 8–9.

26. Ibid., 14.

27. Briefing, Air Force Requirements Council.

28. Leland and Wilcoxson, *Chronological History*, 2.

29. Tirpak, "Saving the Galaxy," 31–35.

30. The US Air Force's first air and space expeditionary force deployed in October 1995 to Southwest Asia. Lt Col Michael J. Nowak, *The Air Expeditionary Force: A Strategy for an Uncertain Future?*, Maxwell Paper no. 19 (Maxwell AFB, AL: Air War College, August 1999), 10, http://www.maxwell.af.mil/au/aul/aupress/Maxwell_Papers/Text/mp19.pdf.

31. Briefing, Lt Col James A. Spaulding, commander, 715th AMS, and author, to Air Force Council, Washington, DC, subject: C-5 Expeditionary Operations, 12 December 2002.

32. Inscription, personal photo from James Roche, former secretary of the Air Force.

33. Rick Sauder, "Entering a New Galaxy," *Airlift/Tanker Quarterly* 11, no. 1 (Winter 2003): 13, http://www.atalink.org/atq/ATQ_Winter_2003.pdf.

34. Air Force Instruction (AFI) 11-289, *Phoenix Banner, Silver, and Copper Operations*, 16 February 2006, http://www.e-publishing.af.mil/pubfiles/af/11/afi11-289/afi11-289.pdf.

35. Hard crews are a set of crew members who always fly together.

36. "US Pony Express," *The History Channel*, 13 November 2003.

37. Adam J. Hebert, "Air Mobility's Never-Ending Surge," *U.S. Air Force AIM Points*, 7 September 2006, http://aimpoints.hq.af.mil/display.cfm?id=13670.

38. According to AMC's "line assigned" aircrew data for 2002 and 2003, C-5 pilots average the highest number of temporary duty (TDY) days of all AMC pilots. C-5 copilots at Dover AFB, DE, in 2003 averaged over 215 days TDY, beating all other AMC aircrew positions by over a month. Additionally, C-5 aircrew "weighted averages" were the highest of all AMC's airlifters for those two years.

39. After mobilization of Air Force Reserve aircrews prior to Iraqi Freedom (January–March 2003), the author, serving as deputy operations group commander at Travis AFB, CA, witnessed less than 10 percent of C-5 aircrews ever approaching the flying-hour limit of 330 hours in 90 days as specified in AFI 11-202, *Flying Operations*, vol. 3, *General Flight Rules*, 5 April 2006, 69, http://www.e-publishing.af.mil/pubfiles/af/11/afi11-202v3/afi11-202v3.pdf.

40. TSgt Chuck Marsh, "C-17 Deployment Length, Efficiency Increase," *U.S. Air Force AIM Points*, 11 July 2006, http://aimpoints.hq.af.mil/display.cfm?id=12484.

41. Gen T. Michael Moseley, to commanders of the major commands and deputy chiefs of staff, letter, 17 May 2006.

42. Gen John P. Jumper, "Combat Wing Organization," "Chief's Sight Picture," 2002.

43. Ian Thompson, "Service under Fire—Travis Crew Recalls Baghdad Mission," *Daily Republic*, 21 January 2004, http://dailyrepublic.com/articles/2004/01/21/news/news1.txt.

44. Combat mobility training involves the merging of ancillary training, mission-qualification ground training, and tactics, which produces a near-mission-ready, expeditionary FTU graduate. Previously accomplished in-unit, as of 2006, 13 of these 15 events are now accomplished by the FTU at Air Education and Training Command. Other initiatives proposed but not in combat mobility training include training in night vision devices, airdrop, formation, and so forth.

45. See data from AMC's GO81/Broker Aircraft Maintenance System for the C-5, C-141, KC-135, KC-10, and C-17 aircraft. It also has provisions to accommodate other aircraft.

46. See Air Force Policy Directive 16-3, *Operations Support*, 26 January 1994, http://www.e-publishing.af.mil/pubfiles/af/16/afpd16-3/afpd16-3.pdf.

47. GO81 data.

48. "Joint Precision Airdrop System (JPADS): Advanced Concept Technology Demonstration (ACTD)," *US Army Natick Soldier Center*, http://www.natick.army.mil/soldier/media/fact/airdrop/JPADS_ACTD.htm.

49. "Air Mobility Warfare Center," USAF fact sheet, http://www.amc.af.mil/library/factsheets/factsheet.asp?id=233.

50. Former commander, C-17 EAS, to the author, e-mail, May 2003.

51. Hon. Michael W. Wynne, "Letter to Airmen: Air Force Smart Operations 21," 8 March 2006, http://www.af.mil/library/viewpoints/secaf.asp?id=219.

52. Estes, "Revolution in Airlift," 15.

Fit (and Ready) to Fight

Strengthening Combat Readiness through Controlled-Aggression Training

2d Lt Nickolas Stewart, USAF

BECAUSE DEPLOYMENTS to forward-operating locations put Airmen in harm's way, they must remain keenly attentive and ready for possible attack at all times. Not long ago, warfare consisted mostly of movements by uniformed armies fighting with tanks and aircraft. Today in Iraq, however, suicide bombers and jihad-motivated terrorists pose the primary threat. Unfortunately, Airmen are not as ready as they should be for dangerous, close-proximity encounters with the enemy.

This is not an issue of legal restraint or poor equipment but of inadequate military preparation. The Air Force trains its personnel well in the Law of Armed Conflict, equips them properly, and assures their proficiency with firearms, but—unlike most members of our sister services—few deployed Airmen receive extensive training in hand-to-hand combat. Such expertise might represent the difference between life and death for unarmed Airmen or those who have exhausted their ammunition.

Comments by 2d Lt Raymond Fernandez of Los Angeles AFB, California, who deployed many times to Afghanistan and Qatar as an enlisted man, typify the current situation: "If we had ever been overrun or even attacked individually, I don't think anyone would have known what to do. I certainly wasn't trained to fight individually."[1] Even aircrew members, some of the service's most highly trained personnel, don't receive much instruction in personal defense following an aircraft ejection, a skill they need if they have to fight an enemy in hand-to-hand combat.

Given these circumstances, either the Air Force can continue to deploy poorly prepared Airmen into harm's way or it can better prepare them for the war on terrorism by providing them combat training—for example, by using "Iron Tiger immersion" to instruct all Air Force specialties in self-defense and personnel-defense training.[2] This program's defense courses would adopt the most applicable aspects of Chinese and Brazilian jujitsu, kenpo, aikido, pakua, and the hsing-i martial arts. Specifically, all of the Air Force's enlisted basic trainees; Reserve Officer Training Corps, US Air Force Academy, and Officer Training School cadets; and officer trainees should know weapons disarmament, arms recovery, rapid-withdrawal techniques, controlled-aggression practice, takedowns, and self-defense / personnel defense. These skills, in conjunction with good negotiation techniques, could save the lives of American Airmen.

Initial training would prove sufficient to significantly improve the chances of survival in a hostile environment. It would follow Airmen through their careers, continuing at all levels of enlisted and officer professional military education (PME). From the Air and Space Basic Course to Air War College, and from the First Term Airman's Course to the Senior Noncommissioned Officer Academy, all Airmen would continually enhance their self-defense readiness. Whether such training also occurs at equivalent sister-service / joint, inter-

mediate, and senior developmental-education schools would remain the decision of those services and the Department of Defense.

Defense training is the natural counterpart to the Air Force's Fit to Fight program, designed to assure the fitness of Airmen, both physically and mentally, for forward combat operations. Much like pilates or yoga, mixed martial arts (MMA) lengthens and leans muscles, strengthens the heart and vital organs, and increases blood flow as well as the ability to manage stress. A dynamic program, MMA prescribes drills ranging from three-mile, slow-conditioning runs followed by calisthenics, to takedown demonstrations and sparring matches. Airmen would see and feel the initial benefits, but the real return on this investment would occur during deployment. Including Iron Tiger in basic training and PME would promote professional competency, self-discipline, and maturity throughout the ranks.

In many respects, American Airmen are the best trained in the world. After all, "developing Airmen" is our first core competency. Yet, in other ways, we may be the weak link in the chain, compared to our colleagues in the other services. The Marine Corps developed a martial arts program in 2000 to train marines and attached personnel in unarmed combat, using edged weapons and weapons of opportunity. In several different programs, Army soldiers train in close-quarters fighting and hand-to-hand combat known as H2H or HTH, and the Army's field manuals for 2002–6 strongly emphasize Brazilian jujitsu. According to Army Field Manual (FM) 3-25.150 (FM 21-150), *Combatives*,

> Hand-to-hand combat is an engagement between two or more persons in an empty-handed struggle or with hand-held weapons such as knives, sticks, or projectile weapons that cannot be fired. Proficiency in hand-to-hand combat is one of the fundamental building blocks for training the modern soldier. . . . In most combat situations, small arms and grenades are the weapons of choice. However, in some scenarios, soldiers must engage the enemy in confined areas. . . . In these instances, or when your primary weapon fails, the bayonet or knife may be the ideal weapon to dispatch the enemy. Soldiers must transition immediately and instinctively into the appropriate techniques based on the situation and the weapons at hand.[3]

The Army and Marine programs may not create a Total Force of experts in hand-to-hand combat, but producing a fighting spirit will yield tremendous benefits. Their programs bind that spirit with character and camaraderie—the warrior mind-set. Because Air Force Airmen often find themselves in the same environment and face the same enemy as sister-service troops, they need similar training in self-defense to bolster their combat abilities, confidence, and fighting spirit. Indeed, this proposal seems to complement the Air Force chief of staff's recent move to provide 19 hours of training in expeditionary combat skills for all Airmen deployed to a war zone.[4]

Despite the Air Force's technological sophistication, combat remains very much a human endeavor. The service must train Airmen to fight the current threat of global terrorism, regardless of the cost in time and money, because it cannot allow its deployed personnel around the world to become targets of opportunity for terrorists. Hopefully, if the Air Force implements the Iron Tiger training proposed in this article, potential enemies will say, "Don't mess with USAF Airmen—they are ready to fight." ❑

Notes

1. 2d Lt Raymond Fernandez, financial analyst, MILSATCOM Systems Wing, Los Angeles AFB, CA, interview by the author, 10 October 2005.

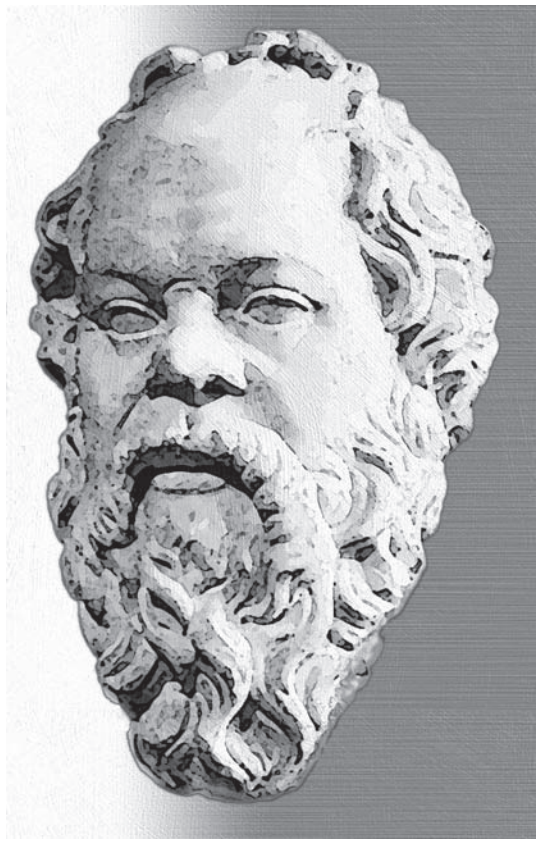
2. The author submitted Iron Tiger immersion for consideration under the Air Force's Innovative Development through Employee Awareness (IDEA) program.

3. Army Field Manual (FM) 3-25.150 (FM 21-150), *Combatives*, 18 January 2002, 1-1, 7-1, https://134.11.61.26/CD5/Publications/DA/FM/FM%203-25.150%2020020118.pdf (accessed 18 October 2006).

4. Adam J. Hebert, "Preparing for a New Way of War," *Air Force Magazine* 89, no. 7 (July 2006): 41, http://www.afa.org/magazine/July2006/0706war.pdf (accessed 18 October 2006).

Leadership by the Socratic Method

Maj Aaron A. Tucker, USAF*



Editorial Abstract: Opining that modern leaders should study the habits of great thinkers and leaders of the past, Major Tucker focuses specifically on Socrates, a retired soldier, stonemason, and philosopher in Athens, Greece, during the fifth century BC. The author argues that since the "Socratic method" forces students toward intellectual self-examination and a logical conclusion, it offers a valuable way to help leaders acquire critical thinking useful for influencing and persuading other people.

LEADERS IN THE twenty-first century would do well to study the habits of great thinkers and leaders of the past. Socrates famously instructed his students through a series of carefully constructed questions designed to force self-examination and lead them to a conclusion. This method for instilling critical-thinking skills is invaluable to leaders in many circumstances as a way to influence and persuade. Contemporary leaders fill many roles: instructor, mentor, leader, follower, and peer. Each of these roles is well served by the Socratic method.

Socrates was a retired soldier and stonemason in Athens during the fifth century BC. He took great pleasure in pulling people into conversation, questioning their assertions, and dismantling their philosophies by turning their own logic against them.[1] In fact he claimed to be "fulfilling the wishes of the gods when he goes about and argues with people."[2] Socrates was unique among the scholars of ancient Athens by presenting himself not as a master of knowledge but as a fellow student working toward the discovery of truth during mostly informal discussions. Such dialogue empowers the student to question the logic and ideas of the instructor even as the teacher gains insight from the student's arguments. As a result, both the instructor and student are better able to order their thoughts and arguments into a stronger, more coherent theory tem-

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pered by relentless hammering in the forge of debate. Socrates described himself as an "intellectual midwife, whose questioning delivers the thoughts of others into the light of day."[3] Too often, however, Socrates used his questioning to disparage his students, not necessarily to help them. We must be wary of the sharp edge of this teaching tool.[4]

The *Socratic method*, or elenchus, is defined as a prolonged series of questions and answers which refutes a moral assertion by leading an opponent to draw a conclusion that contradicts his own viewpoint.[5] During this dialogue, students are forced to critically examine other viewpoints and question their own assumptions and assertions. Socrates developed this elenchus as a "means to examine, refute, or put to shame" and gradually cultivated a school of young Athenians, including Plato, Xenophon, and Aristophanes.[6] Often, his students were left confused and bewildered, not knowing exactly what truth was or what they personally believed. In time, however, the education his students received enabled the development of some of the world's greatest philosophy.

The Socratic method has been widely used throughout history in a variety of circumstances. Plato continued his teacher's tradition of informal instruction and introspection; his most famous student was Aristotle. Benjamin Franklin, in his *Autobiography*, recounted coming across the Socratic method during an early period of self-education: "I procur'd Xenophon's *Memorable Things of Socrates*, wherein there are many instances of the [Socratic] method. I was charm'd with it, adopted it, dropt my abrupt contradiction and positive argumentation, and put on the humble inquirer and doubter."[7] Like Socrates, Ben Franklin also took delight in drawing people into conversation and "entangling them in difficulties out of which they could not extricate themselves."[8] Unlike Socrates, however, Franklin gradually abandoned the sharp edge of dispute and moved toward a method of never expressing himself in absolutes, as a master of knowledge might, choosing instead to present his opinion as just that. Franklin credits this deferential air to his ability to inculcate his opinions and promote his causes.[9] As the representative to France during the American Revolution, Franklin secured French military and financial assistance critical to the defeat of English armies and the birth of the United States as an independent country. His influence at the Constitutional Convention was legendary as the singularly American form of government took shape.

Law and medical schools widely use the Socratic method to educate their students. Law professors start with a real court case and then transform it "into another of [their] peculiar 'hypotheticals,' which [they alter] bit by bit, question by question, so [the students] can see the way each fact relates to the controlling principle."[10] Law students are "tacitly instructed in the strategies of legal argument, in putting what had been analyzed back together in a way that would make [a lawyer's] contentions persuasive to a court."[11] Medical students are likewise instructed through case study and diagnosis. Harvard Medical School wants its students to "identify a gap in their knowledge, feel guilty about not filling it, and have the skills to learn what they need."[12] The result is a level of critical thinking and mental discipline that society depends on for the effective practice of law and medicine.

Use of the Socratic method serves to produce a strong professional in fields that are mainly self-governing. The largely successful efforts of law and medicine to maintain high professional standards (and remarkably little legislative oversight) have their foundation in the emphasis on critical thinking and professional dialogue. Commensurate with the level of trust that society places in its practitioners, the fields of law and medicine have managed to transcend simple training.

Training and education bear important distinctions. Military training, for instance, requires knowledge of and adherence to technical-order procedures, regulations, and rules of engagement. By contrast, education emphasizes critical thinking, original thought, and judgment. Socrates states that he is not a teacher in the sense that "teaching" is simply transferring knowledge from instructor to student. He does, however, engage students in a dialogue designed to enable the discovery of

truth for themselves.[13] Socrates works strictly in the higher levels of cognitive learning. Bloom's taxonomy stratifies the intellectual outcomes of cognitive learning into six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation (see figure).[14] Training delivers to the student *what* to think (application), whereas education involves teaching one *how* to think (analysis), *how* to produce original thought (synthesis), and *how* to make judgments about value (evaluation).

The Socratic method also has drawbacks and, like any leadership technique, fits some situations better than others. Extended philosophical dialogue requires a certain level of knowledge in the examinee, requiring some training in the subject matter in order to exchange a meaningful dialogue. Further, elenchus takes time to unfold and may be somewhat unwieldy in an operational environment. Military leaders must be agile in their leadership style and balance the two goals of developing and persuading their followers with the Socratic method and executing a time-critical mission with a more directive style of leadership. Continual questioning can also be annoying and, perhaps, counterproductive if the questioner is overly enthusiastic. A Harvard Law School student found it hard to take, calling it "unfair and intimidating."[15]

If a leader uses the Socratic method too rigidly, submitting only questions rather than opinions or insights, the student or follower may never know exactly what the leader thinks. One Harvard Law School professor's particular style of questioning threatened to severely disillusion his students: "He just stood . . . and kept asking questions; and as confusion grew, so did dissatisfaction. No one was quite sure what [the professor] wanted from us. Were we stupid? Were the questions bad? What were we supposed to be learning? It was almost as if [he] had set out to intensify that plague of uncertainty which afflicted us all."[16] In fact, Socrates's own students complained bitterly about his tendency to hide behind elenchus: "We've had enough of your ridiculing others, questioning and refuting everyone, while never willing to render an account of yourself to anyone or state your own opinion about anything."[17] Leaders must trust their followers enough to reveal themselves, or the Socratic method can become just a veil of questions that hides their true thoughts—or lack thereof.

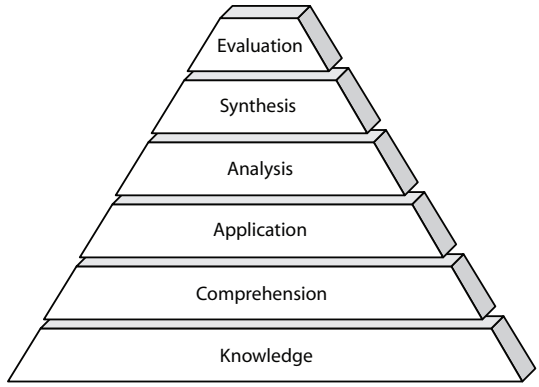

Figure. Bloom's taxonomy of the cognitive domain

Leadership in the twenty-first century has many emerging challenges, and leaders require tools to meet those tests. Taking lessons from an ancient technique for self-inspection provides one such tool for modern leaders to use in their many roles. Two thousand four hundred years ago, Socrates used elenchus—a series of leading questions—to educate his students in critical thinking and to challenge their assumptions. Modern law and medical schools have extensively used this form of instruction to educate and sharpen the intellect of future professionals. Similarly, the Socratic method can serve twenty-first-century leaders to instruct students, mentor protégés, motivate followers, advise other leaders, and influence peers.

Leadership by the Socratic Method

Military leaders, both officer and enlisted, find themselves in five roles in which they can implement the Socratic method:

- As instructors in formal training.
- As mentors while grooming protégés for professional growth.

- As formal leaders while motivating people toward an objective.
- As followers who employ critical thinking skills to advise leaders.
- As peers interacting with others.

Each role allows the practice of the Socratic method to exercise critical thinking, creativity, and problem-solving skills while providing for a more effective, efficient solution to the problem at hand.

As Instructors

> *If you are to come to the truth, it must be by yourself for yourself.*
>
> —Socrates

The Socratic method can be effectively used to promote critical-thinking skills, build student confidence, and expand the instructor's own knowledge. During a lecture, the instructor seeks to transfer knowledge directly to the students. Often, students are forced to follow the instructor's train of thought or logic, making the task of learning doubly hard. While lecturing certainly has its place in the first step of Bloom's taxonomy (knowledge), allowing students to grasp the application and meaning of the intended lesson is best accomplished by guiding the thought process with Socratic dialogue. Additionally, the instructor can use students' responses to evaluate comprehension, allowing him or her to fine-tune the presentation.

Instruction using leading questions will help build confidence as students solve problems with familiar thought processes. The instructor's goal is to guide students to ask the right questions that lead them to reach reasonable conclusions. A common student complaint is, "I don't know where to start." Often, that answer is gained only through experience, which is where the Socratic method becomes useful. Instead of telling the student where to begin and forcing him or her to memorize the answer for future use, the instructor can simply ask what things are important in the task. The student can now follow his or her own rationale to the answer, which validates both knowledge and comprehension while providing fodder for further dialogue. This type of discussion leads the student to an appropriate conclusion. Elenchus transfers the burden of following a logic flow from the student to the instructor as they navigate to the answer together. When students see that they have answered their own question with a familiar logic, the ability to retrace their own thought process will promote confidence in future success.

A great advantage of using the Socratic method is that sometimes the student's conclusion isn't the one that the instructor originally predicted but is even better or at least acceptable. Through the student's answer, the instructor can assess the relative strengths of different courses of action and choose a new, creative path to continue the dialogue. Upon arrival at a more effective solution, both the student and instructor have benefited from a synergy made possible through the shared effort of the Socratic method.

An instructor aircraft commander (an area of the author's personal experience) can make excellent use of the Socratic method. The aircraft commander is a pilot with the specific responsibility and final authority for the safe operation of an aircraft and successful completion of its given mission. A myriad of agencies and resources is available to the aircraft commander in order to ensure safety and a successful mission. Some tasks require no action, some require monitoring, and some require constant intervention to run in sequence and on time. The student aircraft commander has to continually apply critical thinking to each process to decide whether to act on it, delegate it, or take no action. The instructor could ask what the student perceives, what his or her intentions are, and the reasons for that decision in short order. The student is therefore allowed to handle issues quickly and successfully, building self-confidence while ensuring mission success. The student quickly learns that the instructor is there not to lecture (and unnecessarily increase the workload) but to serve as a sounding board for the student's ideas and actions. Sometimes the student's course of action is more effective than the instructor's idea. In this case, the student bene-

fits from positive feedback on the success of his or her plan, the instructor learns a new technique to apply to future instruction, and the mission benefits from the synergy.

The instructor should let the student know that he or she doesn't have all the answers and also suffers from fears, doubts, and insecurities.[18] If teaching is simply transferring knowledge from teacher to student, then Socrates did not teach. Socrates defined teaching as "engaging would-be learners in . . . argument to make them aware of their own ignorance and enable them to discover for themselves the truth the teacher had held back."[19] Socrates's role in teaching is not to defend a thesis of his own but only to examine the student's assertion.[20] In the end, however, the teacher tests his or her own beliefs and assertions as student points are examined, dissected for logic, and then reassembled stronger than before.

As Mentors

> *You may plant a field well; but you know not who shall gather the fruits: you may build a house well; but you know not who shall dwell in it.*
>
> —Xenophon

Mentors are charged with developing quality replacement personnel and must therefore act as both instructor and evaluator. The Socratic method is well suited to both tasks and can provide intellectual development as well as practical training for protégés. It can then assist specific protégés in further development and eventual promotion to leadership positions. Leaders trained in self-examination techniques and educated with critical thinking ensure future organizational success.

The mentor can seed the field of leader candidates by addressing groups and by conducting one-on-one conversation. Questions posed to groups mimic the style used by law and medical schools and quickly generate lively discussion as the candidates generate ideas. The mentor can shepherd the discussion to enable the group to reach an important lesson or truth while simultaneously illuminating his or her own critical-thinking processes. Dialogue becomes more powerful as the mentor uses the protégé's own knowledge base to guide a philosophical thread. When the philosophy outstrips the protégé's experience, the mentor can continue to instruct and elucidate the concept under examination. The protégé learns both new concepts and thought processes, which are valuable since the mentor, a successful leader, has already internalized them.

The mentor, while interacting with candidate leaders, can also evaluate each individual's cognitive-learning level as prescribed in Bloom's taxonomy. Lines of questioning can evaluate each of the six levels, from knowledge to evaluation. How much does the candidate know (knowledge)? How does he or she apply it to a new situation (application)? Is it right (evaluation)? The mentor can determine each candidate's level of training in the first two questions and critical thinking ability in the third. This evaluation allows further discrimination within the pool of candidates and a more efficient investment of professional-development energies.

As Leaders

> *Leadership is the art of getting someone to do something you want done because he wants to do it.*
>
> —Dwight D. Eisenhower

A person in a formal leadership position can use the Socratic method to persuade, secure support, encourage an active followership, and develop followers for better efficiency. Well-timed dialogue with subordinates can allow the leader to both receive their counsel and secure buy-in to proposed policy. Questions can be posed in conference with advisors. This dialogue allows leaders to reveal their rationale and seek feedback on their thought process from subordinates. Subordinates who are consulted in such a manner are more committed to a proposed action or policy than otherwise, and through such dialogue, the leader may learn of an unpredicted result that could be easily mitigated early but would be difficult to overcome after the act was committed or policy published. Both the policy

and its support are simultaneously improved by exercising the Socratic method.

Active followers are crucial to a leader's success. For followers to show initiative, however, the leader must be open and predictable. Leaders who question their counselors receive the dual benefit of making better decisions because of their advisors' input as well as increasing trust within the organization. Followers who trust that they know their leader's mind can take the initiative without acting contrary to the leader's philosophy.

Leaders throughout history have used staffs to enable the administration of expanded spheres of influence. A staff that understands the mind of its leader is more efficient in its duties and more effective in assisting the leader. A leader who spends some time in dialogue with key staff members educates them on his or her thinking, which guides the spirit and logic of subsequent efforts, resulting in realized efficiencies.

Abraham Lincoln, one of the most assertive presidents in history, guided his staff with shrewdness and subtlety. Lincoln was a very effective practitioner of the Socratic method. His leadership style encouraged innovation and risk taking as he would let his subordinates proceed with the belief that it was their idea. If their plan was not to his liking, Lincoln would "focus, direct, or point his people to what he viewed as the proper path."[21] Just as Socrates claimed not to be a teacher while guiding his students to self-knowledge, Lincoln made a similar declaration: "I claim not to have controlled events, but confess plainly that events have controlled me."[22]

> George E. Baker, private secretary to [Secretary of State] Seward, described how Lincoln had changed his practice from year to year in the matter of signing the many public documents brought to him by Baker. During the first few months of his Administration he read each paper carefully through, remarking, "I never sign a document I have not first read." At a later period he asked the messenger, "Won't you read these papers to me?" Still later he requested merely "a synopsis of the contents." And in the fourth year his expression most often was, "Show me where you want my name." Seward's secretary mentioned this development as though Lincoln might have been more expeditious to begin with. This was not entirely so. The first year had been given to training Seward in several respects. And as the two had fraternized and policies in degree clarified, their mutual understanding was such that Lincoln could now usually say with perfect safety, "Show me where you want my name," whereas during the first year he would have been near ruin more than once had not his habit been to say, "I never sign a document I have not first read."[23]

Similarly, Winston Churchill evoked creative solutions from his staff during World War II by challenges and questions. Often he would set forth a proposal with the purpose of eliciting critical feedback and creative counterproposals: "The purpose of many of his proposals, especially his more imaginative and impractical ones, was to stimulate others to use their own imagination and initiative in solving a problem."[24]

As Followers

> *The greatest trust between man and man is the trust of giving counsel.*
>
> —Sir Francis Bacon

The concept of using the Socratic method from a follower position capitalizes on the idea that a solution resulting from such a dialogue has a synergistic potential not available to either the leader or the follower in isolation. The follower has the opportunity to affect policy and impress his or her own logic and rationale on the leader through open dialogue. Effecting a line of questioning from the position of follower requires tact, discretion, and a high level of trust. Both the leader and the follower must trust each other's integrity and the method.

Niccolò Machiavelli, a minister to princes in fifteenth-century Italy, aspired to open dialogue with his leaders. In *The Prince*, he advised leaders to "choose wise men in his state who alone have the freedom of speaking the truth to him, and then . . . ask them about everything, listen to their opinions and subsequently resolve for himself to his liking, and comport himself in such a manner that each councilor knows that the more freely he speaks

the more he will be accepted."[25] Unfortunately, some of his princes did not see the practical benefits to finding truth through Socratic dialogue and imprisoned and tortured Machiavelli.[26]

Often, the benefit of dialogue is the illumination of a point; however, initiation by the follower often adds an additional benefit. The follower can determine the sense of the leader and enable more effective counsel in the future. Further, the follower's insight into the leader's personal philosophy can be carried back and discussed with his or her peers. The leader's base of followers is improved as a result of the effort of one follower using the Socratic method.

As Peers

> *If everybody is thinking alike, then somebody isn't thinking.*
>
> —Gen George S. Patton Jr.

Leadership among peers is a difficult proposition. Without the bully pulpit of a formal leadership position, a person has little leverage to force a line of questioning. Also without the benefit of knowing the destination of the thread of philosophical thought, dialogue is less efficient but still benefits from the inputs of multiple participants. There is a peculiar benefit to this application, however. Peers are generally more open and frank with each other than they are with their superiors and are willing to share contrarian viewpoints. Despite the lack of a formal instructor, peer groups can use Socratic dialogue to help discover answers. While the process can seem a little misdirected and disorganized, the approach can be both fun and rewarding. Often people learn best when they find answers themselves.[27]

Care must be taken that the Socratic method doesn't exasperate peers and lose the intended objective of exercising critical-thinking skills. Ben Franklin related his experience with a coworker: "I used to work him so with my Socratic method, and had trepann'd [trapped] him so often by questions apparently so distant from any point we had in hand, and yet by degrees led to the point, and brought him into difficulties and contradictions, that at last he grew ridiculously cautious, and would hardly answer me the most common question, without asking first, '*What do you intend to infer from that?*' " (emphasis in original).[28]

Conclusion

Although the Socratic method was originally used for self-examination and the search for philosophical truth, twenty-first-century leaders can apply its power to the needs of modern leadership. As an instructor, the leader can promote critical-thinking skills while evaluating the student's knowledge and comprehension in order to fine-tune further instruction. The student benefits by following a familiar, repeatable thought process (his or her own) and gaining self-confidence. Socratic dialogue assists the mentor by providing intellectual development and candidate evaluation for future leaders. In a formal leadership capacity, dialogue helps secure support, encourage active followership, and develop efficient staff personnel. Similarly, a follower can use the Socratic method to probe the leader's rationale and affect policy with a synergy not available to the leader in isolation. Peers can improve each other's critical-thinking skills and insight through open dialogue that promotes creativity and constructive feedback.

The Socratic method does have its drawbacks, and modern literature abounds with other effective leadership techniques, each with a particular strength. Pointed questioning requires a certain level of knowledge in the examinee, takes time to execute, and can be annoying if the questioner is overly enthusiastic. Also the leader must endeavor not to hide behind a veil of questions, never giving his or her own philosophies or opinions to followers. Other leadership techniques are more directive, immediate, and simpler for the leader to use. Unfortunately the follower receives little energy toward his or her development, and no feedback path exists except for the brave soul who is willing to speak up.

Twenty-first-century leaders face issues similar to those encountered by citizens in classical

Athens. Both require a method to promote critical thinking and self-examination in the pursuit of truth. Socrates's elenchus provided a solution in his method of simple questioning to bring forth creative thought for inspection and contemplation. The leader serves as a "jeweler of ideas. He uses his questions like a goldsmith's hammer, working the concepts down to an incredible fineness and shine."[29] ❑

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17. Vlastos, *Socrates*, 32.
18. Elkind and Sweet, *Socratic Approach*.
19. Vlastos, *Socrates*, 32.
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22. Ibid., 99.
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26. Ibid., 15.
27. Maj Norman H. Patnode, "The Socratic Method: Leveraging Questions to Increase Performance," *Program Manager* 31, no. 6 (November–December 2002): 48.
28. Franklin, *Autobiography*, 62.
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Revised USAF Doctrine Publication

Air Force Doctrine Document 2-7, *Special Operations*

Lt Col Alexander M. Wathen, USAF, Retired

Air Force Lieutenant General Charles Wald . . . recalled that the rapid progress of the Northern Alliance in early November 2001 had been enabled by the targeting support provided by just "three or four [special operations forces] guys on the ground."

—Benjamin S. Lambeth
Air Power against Terror

AIR FORCE SPECIAL operations forces (AFSOF) provide unique capabilities to the war-fighting combatant commander. Air Force Doctrine Document (AFDD) 2-7, *Special Operations*, 16 December 2005, describes AFSOF's support to the joint force commander and reiterates the command relationships that enable him or her to leverage the capabilities of those forces as part of a greater campaign plan. This operational doctrine document guides the employment of AFSOF to meet today's threats.

AFDD 2-7 supersedes its previous version (dated 17 July 2001) and updates key AFSOF doctrine concepts and terms. As America continues to engage in the global war on terrorism, AFSOF has shifted from a platform-based to a capabilities-based model that can accommodate such a campaign. Signaling a change in paradigms, this publication offers a revised discussion of modern AFSOF and the application of certain enduring principles and guiding truths; places more emphasis on AFSOF's core tasks and missions as defined by US Special Operations Command (USSOCOM) directives; updates and clarifies command, control, and organizational relationships; and refines AFSOF planning and support considerations.

AFDD 2-7 includes short, interesting, and well-written vignettes portraying the birth of AFSOF and its evolution through the present day. Readers unfamiliar with the terms *carpetbaggers* or *air commandos* as they apply to airpower don't know AFSOF. Particularly notable is the fact that these vignettes include not only success stories but also examples of failures and the way those failures have helped the force evolve.

Every Airman having an investment in the application of airpower should read AFDD 2-7 because it provides a worthy introduction to AFSOF's unique mission, command relationships, and operating motive. For example, the document amply describes Air Force Special Operations Command's responsibility, as the air component of USSOCOM, to organize, train, and equip AFSOF to provide the necessary air capabilities to conduct USSOCOM's nine core tasks:

- counterproliferation of weapons of mass destruction
- counterterrorism
- special reconnaissance
- direct action

- unconventional warfare
- foreign internal defense
- information operations
- civil affairs operations
- psychological operations

In the process, AFDD 2-7 provides short explanations of each of these tasks. Furthermore, it goes on to list and describe AFSOF's core mission areas:

- air-to-surface interface
- agile combat support
- combat-aviation advisory operations
- information operations
- intelligence, surveillance, and reconnaissance
- personnel recovery / recovery operations
- precision fires
- dissemination of psychological operations
- specialized air mobility
- specialized refueling

These examples reflect the range of information about AFSOF available from AFDD 2-7. Furthermore, the doctrine document provides a strong understanding of how AFSOF interacts with the joint force, detailing operating and command relationships. It is a must-read for all Airmen. ❑

The Mandate to Revolutionize Military Logistics

COL Bradley E. Smith, USA

Editorial Abstract: In 2003 senior leaders of the US military establishment called for the designation of a military-wide distribution process owner (DPO). They took this action to head off the often-observed disconnects among tactical, operational, and strategic distribution as well as other associated logistical processes. The author posits that this long-overdue initiative represents a revolutionary paradigm shift in the ways we should conduct logistical operations in both peace and war.

IN SEPTEMBER 2003, the secretary of defense designated US Transportation Command (USTRANSCOM) as the distribution process owner (DPO) for the Department of Defense (DOD). It was a signal that systemic solutions need to be instituted at the national level to better integrate military logistics, especially in the areas of transportation, supply, and information technology. The secretary's directive was a call to action for the entire logistics community to make the necessary organizational and cultural changes to establish one distribution system for the entire military.

The call was in stark contrast to logistics at the tactical level, which has been successful in Afghanistan and Iraq.[1] With few exceptions, Americans know that their soldiers, sailors, airmen, and marines are adequately provisioned to fight the battles. While there have been some contentious, publicly debated issues such as body-armor shortages and add-on armor for vehicles, media coverage focused on industrial production and election-year politics—not the distribution pipeline and supply chain management.[2] Actual shortages are few compared to those of past wars.

Still, there is room for significant improvement at the higher levels of our logistics infrastructure to project and sustain combat forces worldwide. Our leaders need to improve the

way they integrate tactical, operational, and strategic processes to form a more effective, streamlined distribution pipeline.[3] Shortly after the invasion of Afghanistan, many disconnects occurred due to training issues. For decades the military reduced training opportunities involving expensive, large-scale unit moves that would have increased an already high operations tempo. Exercises and war games were conducted with reduced numbers of tactical line personnel. Even then, logistics and distribution challenges did not receive sufficient emphasis.

The onus is upon the DPO to make fundamental changes in the ways we conduct large-scale logistical operations. First, systemic changes must be made to ensure proper linkage and synchronization throughout the entire distribution pipeline. Second, we must find new ways to provide the most effective support to units engaged in combat without incurring large additional costs. As *Federal Times* reported on the initial tip of the iceberg, "During the first month of major combat operations in Iraq two years ago, the Defense Department lost track of $1.2 billion in materials shipped to the Army, encountered hundreds of backlogged shipments, and ran up millions of dollars in fees to lease or replace storage containers because of backlogged or lost shipments."[4] As US international commitments continue to grow, there is no guarantee that additional resources will be provided to the DOD. While most senior leaders would recognize the need to find ways to work smarter with fewer resources, paradoxically, they would also acknowledge that many efficient peacetime operations have no place on the battlefield. Combat effectiveness outweighs all other considerations.

Revolution in Military Logistics

Change is difficult for any organization, military or civilian; therefore, the more controversial changes are usually introduced over time. Any significant, new procedures are embraced by a relative few and thus pose challenges to teamwork as a whole. Significant change in a short period of time—even for all the right reasons—seldom occurs at the higher levels. Proponents of change for the better are not always rewarded, so impressive-sounding phrases and glossy pamphlets precede actual achievement. The slow progress of military evolution may be acceptable in peacetime but not when survival of the nation is at stake. Senior military officials must take the necessary risks and proceed to effect a "revolution in military logistics" that has been talked about for over a generation.

Fixing responsibility for distribution at the four-star level sets the stage for progress. For the first time, we have what is *in essence* a distribution command that subsumes responsibility for transportation and a portion of defense logistics and operations-information technology. The movement of information in near real time is as important as the physical movement of personnel, cargo, and supplies. It will take four-stars to effect change to systems currently in place and bring our information technologies into the twenty-first century. The amount and type of logistical forces must ultimately be reorganized. New roles and missions will have to be assigned. All of this must be accomplished to achieve situational awareness of all distribution considerations, including power projection and the generation of combat power in-theater.

Revolutionary Change in Transportation

After becoming the DPO, USTRANSCOM expanded its mode-manager mission to encompass the systemic whole of the Defense Transportation System. In the past, the command operated exclusively between ports of embarkation and ports of debarkation. Today the focus is more holistic and extends from factory or depot, through forward distribution points inside the theater, to forces engaged with the enemy. Movement of up-armored high mobility multipurpose wheeled vehicles (HMMWV or humvee; up-armored HMMWV is designated UAH) is one example of mission growth. USTRANSCOM and project managers analyzed production schedules in the United States, tracked the flow from stateside facto-

ries to Kuwait, monitored in-theater upgrades with ancillary equipment such as blue force trackers and combat-identification panels, and tracked onward movement by surface or intratheater air into Iraq.[5] They closed gaps between strategic and operational transport to eliminate delays with UAH delivery. Tactical commanders received progress reports so they could anticipate the receipt of UAHs for planning purposes.

Revolutionary Change in Supply

Advancements in transportation must coincide with improvements in other areas before the overall distribution chain is strengthened. Holistic improvements in supply might not be as readily forthcoming. Unity of command has not been established for USTRANSCOM to fulfill the supply portion of its DPO mission. USTRANSCOM has no assigned quartermaster organizations. They are all transportation related—Air Mobility Command (AMC), Surface Deployment and Distribution Command (SDDC), and Military Sealift Command. DPO initiatives are constrained to the goodwill and informal relationships established with supply-oriented organizations such as the Defense Logistics Agency (DLA). Cooperative efforts alone will not bring about a revolution in military logistics. *That* will require unified efforts through a clearly established chain of command.

Depot packing of containers is an example of the close links between supply and transportation and of the reasons it will take unity of effort to resolve some long-standing problems. In past wars, procedures at national-level warehouses have caused tremendous hardships at forward-distribution points in-theater and have damaged the combat readiness of units on the line. In peacetime, warehousemen have been rewarded for filling containers to capacity, which oftentimes resulted in multiple consignees per shipment. Transportation metrics drove supply procedures, proved to be highly efficient, and significantly reduced costs. Such an approach is disastrous in wartime since forward-distribution points are not resourced with enough materials handling equipment and personnel to deal with multiple consignees dispersed across the battlefield. Troops physically cannot unload and reload containers quickly enough for onward movement to keep pace with throughput demands, so containers with mixed consignees have to be pushed forward to a single recipient. Units that never receive their goods must reorder, but there is *still* no guarantee that they will ever receive their materiel if peacetime protocols are followed at depots. Readiness in combat suffers, and nonmonetary costs are staggering. Second-order effects include a general loss of confidence in the supply system at the tactical level. Troops inflate priorities on requisitions. Out of frustration, commanders demand movement by air even though surface transport is responsive enough to meet required delivery dates. Trust in the distribution system is destroyed. Ironically, measures put in place at the strategic level to achieve cost-center efficiencies in fact manifest themselves into gross inefficiencies throughout the operational and tactical realms. While some improvements have been made, it will take a united effort by transporters and quartermasters under one commander to straighten it out and institute effective organizational practices for the long term. A single commander with complete oversight of the distribution system would also be able to capture total systemic costs, both financial and nonfinancial, and make the best decisions in support of the war fighter.

Distribution challenges involving depot-level packaging have deep institutional roots that stem from an unwillingness to adopt costly procedures with the sole justification of directly supporting troops in combat. Because logisticians at the national level are so far removed from the battle, it is difficult for them to financially justify modifying their efficient peacetime practices. Again, one commander with complete oversight of the entire distribution pipeline is needed to weigh all considerations. For example, mismanagement of supplies and sequencing of shipments were principal lessons of the Spanish-American War. Railcars—the containers of their day—were packed and shipped to Florida for onward movement by ship with total disregard for the ground fight in Cuba. Confusion ensued at the port of

Tampa as logisticians unsuccessfully tried to sort out the mess. In Vietnam, an unmanageable iron mountain of containerized materiel was received at seaports and could not be sorted for onward movement to tactical units. Throughout Operation Desert Storm, the US Army faced the same problems we do today concerning containers with multiple consignees. Currently in Iraq, millions of dollars in penalty costs are assessed each month for a multitude of reasons, many of which can be traced back to a fundamental difference of opinion between strategic-level logisticians and tactical-level combat commanders concerning the use of containers. (At the national level, logisticians were leasing and procuring containers as if they were transportation commodities to be quickly returned from Iraq. But tactical-unit commanders did as they always have in combat and held on to containers to be used for mobile storage, bunkers, security walls, and work space.)

"Brute force" logistics used throughout the nineteenth and twentieth centuries is no longer a viable way to support the US armed forces of the twenty-first century. Senior leaders can now capitalize upon improved communications, computers, and other advanced technologies to achieve greater efficiencies and fulfill unrealized potentials within the distribution system. Disconnects between the strategic, operational, and tactical worlds manifest themselves in many different ways, and it will take a DPO with the right component commands, using the chain of command, to sort out the complexities and unify the effort.

Revolutionary Changes in Information Technology

Two obstacles block real progress in reforming the military's information technology. First, many computer systems are inadequate since the basic architecture is generations old. The military services have simply added new applications to systems over the years without replacing the basic foundation. At some point, applying new technology to a generations-old frame will no longer suffice. The military continues to spend billions of dollars on new applications to old computer architecture to get immediate results. Second, we have a systems-integration problem. Almost every computer system that currently exists within the DOD has been developed to meet specific service or unified-command needs and does not tie into a larger, integrated whole. (This is the same challenge that confronts our intelligence and law enforcement agencies. Now the American public is holding them accountable since they were not able to work together before 11 September 2001.) In the DOD, it will take a concerted, cooperative effort by the four-stars to integrate systems into a coherent whole, thereby enabling holistic assessments about all aspects of our military, *including* the distribution pipeline.

Architecture supporting the Joint Operation Planning and Execution System (JOPES) illustrates both these challenges. JOPES is critical to our military's ability to respond to threats worldwide. This system (under another name) originated in the 1950s and has been upgraded with applications and name changes over the years. The JOPES software provides a way for component commands to request strategic and operational transportation, which supports only a portion of the distribution pipeline. The JOPES charter is actually much larger, as its name suggests, but the software meets few needs of the tactical commander. It does not integrate tactical or operational planning or allow staff officers to easily manage unit movements, supply needs, and transportation requirements. Nor does it track the generation of combat power flowing into the theater. In addition, the products produced are complex and cumbersome—enough so to make warriors cringe. It requires months of specialized training and a great deal of patience to input data and interpret results. JOPES must be enhanced to help revolutionize military logistics as well as other war-fighting capabilities.

All of the JOPES functions need to be incorporated into a new, single architecture to provide tacticians a complete picture of personnel and materiel on the ground, properly arrayed for battle, as well as what is en route by air or sea, in order to anticipate *total* combat capability. Its current focus upon the move-

ment of personnel and unit equipment needs to be included in a new and more comprehensive capability that incorporates all aspects of distribution, and then those considerations must be inculcated into the greater automated realm of strategic- and operational-level war planning and execution. Through execution, future JOPES technology must provide automation support to decision makers across the entire spectrum of joint-operations planning, including redeployment of forces, reconstitution, and in-transit visibility. Combat commanders need comprehensive situational assessments based on near-real-time information. The current system is simply too outdated and clumsy to continue with incremental upgrades to accomplish those goals.

JOPES Planning in the Future. Because logistics is so integral to tactical warfare, automated tools for tacticians to conduct course-of-action analysis must automatically factor in distribution. Transportation and supply features should be built into the software, along with other basic essentials such as tactical maps and unit symbols. As tactical courses of action are contemplated and included in computer scenarios, associated logistic units, supply requirements, and optimum strategic-lift estimates should be automatically programmed as well for each analysis. After a course of action is selected, the supported and supporting commands should be given immediate and simultaneous access to take anticipatory actions, including validation and scheduling of lift. This envisioned process should occur within JOPES and must be far more compressed and user friendly than it is today. Tacticians would be better equipped and more quickly able to brief battle plans that include all the strategic, operational, and tactical underpinnings, many of which involve distribution. Decisions could be expedited and agility improved at all levels.

JOPES Execution in the Future. Moving information in near real time has just as much importance as moving cargo and supplies. If tacticians are ever to gain visibility over large unit moves in their entirety, then revolutionary change in our information technologies will be absolutely necessary. If logisticians are to achieve an agile distribution system to meet the demands of a fast-paced, fluid battlefield, they must be empowered with the ability to make decisions based on the current status of personnel, equipment, and supplies in the pipeline.

With today's technology, there is no reason that information cannot be displayed in simple, easily accessed formats that allow logisticians and tacticians to make decisions and communicate them using the same Web-based system. The system should allow quick data entries input by warriors with minimal training in order to speed turnaround times for operational assessments. Fulfilling these needs will further empower our tactical commanders and may well revolutionize the way we prosecute the war on terror.

Sufficiently powerful computers may not exist today for one system to collect and process the volumes of data needed to plan and execute global distribution and combat operations. That should not stop our military, for it has accomplished the seemingly impossible before. The US Army built the first modern computer, named Eniac, in 1944 to automate its artillery fire and bombing tables—an extremely ambitious task in its day. While the next generation of computers may come about as the result of DPO initiatives, the effort cannot be accomplished without visionary leadership from the Joint Staff, military services, and unified commands—especially the Joint Forces Command as the joint deployment process owner.

Senior logisticians may serve as a catalyst for change throughout the DOD. But since distribution, strategic movements, and operational-level maneuver comprise only part of the joint planning and execution system, logisticians alone cannot fix the problems with JOPES and achieve its full war-fighting potential. Herculean efforts from outside the logistics community will be needed before revolutionary changes in information technology come about. The challenges are significant and will not be overcome until cultural changes occur at the highest levels of the military.

First, senior-level war fighters have to commit to revolutionizing information technologies to better equip the country to fight its

current battles. Aggressive leaders who embody the warrior spirit do not naturally gravitate towards computers. But these are the very people most needed to ensure that technicians design JOPES to meet war-fighter needs. Air and ground combat officers as well as surface warfare officers are more critical to the success of a new system than are combat logisticians. Done correctly, their efforts would produce a national asset that would be the modern-day equivalent of Napoléon crawling around on his campaign-tent floor, totally engrossed with his maps, working out time-distance calculations as well as war-gaming branches and sequels, positioning his forces and resolving sustainment challenges.

Second, the needs of individual military services have been allowed to subsume the greater joint interests. For generations, service needs, parochialisms, and competing budgetary priorities have thwarted the senior-leader consensus necessary for fundamental and profound changes to JOPES. Strong personalities have been at play across the board, so even stronger ones are needed to prevail.

Third, command climates at the highest echelons of our military have to change. While extremely dedicated and highly successful officers work tirelessly to accomplish assigned missions, they also have the political savvy to protect their reputations. They normally posture themselves so they are not associated with projects that lack momentum and do not progress according to schedule. Significant glitches and unforeseen delays would no doubt occur during the development and initial fielding of a new system the size and magnitude of JOPES. Any concerted effort to bring it into the twenty-first century would be fraught with risk. Because failure in the pursuit of excellence is not an option on many flag-officer staffs, the future of JOPES remains uncertain.

Second-order effects from these challenges create ineffective staff dynamics at high levels. Many have heard the old adage about the staff officer who worked a project and then inherited it again years later upon his return, essentially where he had left off. That's JOPES. Action officers understand temporary delays. They know that their efforts cannot always receive attention from senior personnel who react to urgent priorities of the moment. But they also realize that an important project, worked for generations but not to fruition, is really a hot potato. The history of JOPES and its predecessor systems includes reshuffled proponent responsibilities and mission transfers between commands.

Given the significance of these challenges, the military's cultural biases, and what is at stake for the country, JOPES can only hope for a high-ranking champion to emerge, recognize its significance to the nation, lock horns with the challenge, and ramrod a new product through the system. That person may well have to be someone from outside the uniformed military ranks. The fate of revolutionizing military logistics, among other things, is closely tied to the future of JOPES. Under optimal conditions, it would take years to produce the needed changes. A nation at war needs the very best tools to prosecute the fight, so we need to start now, regardless of the risks involved.

Resourcing the DPO Mission: Reorganization of Staffs and Support Forces

The DPO mission requires changes in the organization of logistical commands and staffs. From the command perspective, line units with specialized training are needed to perform distribution functions and fulfill the theater commander's materiel and information requirements. From the staff perspective, US Central Command (USCENTCOM) is pursuing a new approach. DPO representatives are colocated with theater staff to provide strategic-level analyses and advise operational commanders. These new capabilities could "reach back" to the continental United States (CONUS) and provide the unity of command needed for end-to-end distribution.

CENTCOM Deployment and Distribution Operations Center

USTRANSCOM and USCENTCOM organized a new strategic-level staff called the CENTCOM

Deployment Distribution Operations Center (CDDOC) and colocated it with the land-component headquarters at Camp Arifjan, Kuwait. CDDOC personnel are trained, equipped, and resourced to conduct strategic-level analyses using available information technologies such as the Global Command and Control System, Joint Flow Analysis System for Transportation, and Global Decision Support System. They coordinate with operational staffs such as Army Materiel Command and the DLA to anticipate readiness needs, take corrective action when shortfalls in supply or transportation occur, and work quality-of-life issues in-theater. The CDDOC has been so successful that similar initiatives are being worked in US Pacific Command and US European Command.

The CDDOC joined with Combined Forces Land Component Command (CFLCC) and the DLA to provide more reliable and responsive support to Combined Joint Task Force 76 in Afghanistan. At one time, 100 percent of the task force's sustainment was flown directly from the United States to Kabul. This approach was replaced by intratheater air channels and surface routes through Pakistan using the direct-support warehouses in Kuwait.[6] This significantly reduced shipping time for orders and achieved more responsive support to the war fighter. While more effective means of support also proved more efficient, significant dollar savings were not the driving force for change.

The CDDOC spearheaded the "single ticket" initiative to achieve seamless unit movement from origin to final destination. Previously, onward-movement arrangements were made only after deploying units arrived in-theater. The CDDOC gained visibility of units prior to their departure from the CONUS, eliminated transit delays in-theater, and closed the gap between strategic and operational transportation.

Improving Materiel Management and Supply

Strategic-level changes being made in the quartermaster field complement DPO efforts right now, but there is no guarantee that separate commands will always row together to close the seams between the strategic, operational, and tactical levels. These changes raise questions over command relationships between national-level logistics agencies and the secretary of defense's intent in regards to the "DPO." Ownership implies a high degree of responsibility to streamline the entire distribution system, including supply and materiel management. Responsibility and authority should be commensurate, so one would think that command relationships would also evolve to ensure unity of effort.

The DLA and CFLCC partnered to resolve challenges with the closing of requisitions after goods are received in-theater. During the first six months of Operation Iraqi Freedom, $1.2 billion worth of requisitions had not been closed out electronically by line organizations even though it was believed that most of the supplies had actually been issued out by forward distribution points.[7] (There is no certainty over the accounting for goods since records were not kept in-theater, and the multiple-consignee problem discussed earlier further complicated supply discipline.) Until the receipt process was finalized, funds could not be transferred from Army accounts to the DLA, which caused the agency's cash flow to dry up and threatened its continued operations. Accounts were finally reimbursed by CFLCC, but no permanent fixes have been put in place to ensure that tactics, techniques, and procedures at the strategic level mesh with operations at the tactical level. A gap still exists, and it is the DPO's responsibility to ensure it is closed before the next campaign in the global war.

The DLA has assumed an increasingly important role in executing the general support supply mission in USCENTCOM. The DLA has already issued thousands of national-stock-numbered items in-theater and expanded them to over 7,000 items by 2006. A robust general-support base drives down customer wait time and provides responsive backup support to the direct support base and war fighter. Through proper DLA management, replenishment stocks are ordered well in advance, and crisis management is avoided. Bulk tonnage best suited for surface transport does not have to be flown in on an emergency basis. These efforts have helped close the gap between the operational realm

(theater-supply requirements) and the strategic realm (transportation-required delivery dates). They illustrate that effective support can result in huge efficiencies and cost savings.

Support Forces

New organizations need to be established to execute the DPO mission. After staffs such as the CDDOCs provide strategic-level assessments, military line units with the proper training and resources will be needed at key logistics nodes to implement those staff recommendations.

AMC is organized to execute inter- and intratheater airlift missions, as well as operate airfields for deploying forces, and to maintain unity of command—even though in some cases the command has relinquished operational control of resources to the theater. But AMC's ground counterpart, SDDC, does not have the force structure to accomplish its mode-operations mission and carry out an expanded distribution role. SDDC relies heavily upon Army Reserve units that have already fulfilled their mobilization commitments specified by the secretary of defense. SDDC's active Army units are stretched thin while engaged in operating seaports around the world, even before taking on additional end-to-end distribution responsibilities.

"Deployment and distribution operations" battalions and groups could be organized from the current logistics force structure and manned with personnel trained in transportation, supply, and information technology. This new capability could be used in-theater to reach back to major logistics commands in the United States and ensure that the theater commander's intent is met. Just as AMC moves personnel, equipment, and cargo forward to corps organizations, so can SDDC use these units to execute the surface onward-movement mission from ports of debarkation to points as far forward as corps forward distribution points. Such an approach combines strategic and operational distribution efforts into one unified whole under one DPO chain of command. This is currently the approach we are using to supply our troops in Afghanistan, and it has worked well. But in Iraq, three separate chains of command are involved: USTRANSCOM for the strategic, CFLCC for the operational, and Multi-National Force-Iraq for the tactical. By combining the strategic and operational, no longer would handoffs be necessary at congested aerial ports and seaports, which are not ideal locations to transfer onward-movement responsibilities.

Deployment and distribution operations battalions could also assist the DLA with its emerging general-support base missions. At present, the DLA uses contractors to perform materiel management and warehousing functions. In the future, commercial options may not be viable in some hostile regions of the world, so provisions need to be made to adequately resource the DLA in-theater to perform what are arguably DPO missions. The permanent assignment of active duty or Reserve organizations to the DLA would establish command relationships and training regimens well in advance of overseas missions. Since the military's force structure is unlikely to grow in the foreseeable future, senior leaders would have to resolve any controversy stirred up by considering reassignment of tactical units from force provider commands.

Resourcing the DPO Mission: Information Technology

Computer programs in the US military have been developed independently from one another and do not tie together. To accomplish the DPO mission—as well as other strategic-level missions in the DOD—systems management and holistic assessments of entire processes are needed. If end-to-end distribution is ever to become a reality, it will require integrated software systems.

The logistics community needs to place less emphasis on developing new software systems and more on integrating the prolific number of separate programs that currently exist. Logisticians must work toward a common operational picture that provides the most current status available for all inter- and intratheater movement and tie it all together. We cannot afford to continue waiting for a single archi-

tecture to build the common operational picture. That panacea has been discussed for decades and is not likely to materialize anytime soon, given the competing military services' priorities and budgets.

In light of these realities, the most practical and effective approach—called the "knowledge wall"—is currently being implemented at USTRANSCOM. Task by task and challenge by challenge, leaders are finding ways to employ integration software to pull key data from numerous databases and automatically display the most currently accessible information. Existing programs are linked together to generate charts templated with key management-information fields that are automatically updated as new data enters the database. The intent is to build charts as exportable packages for use in the field by war fighters. While the DPO uses the knowledge wall to monitor the health of the distribution system, other commands will be able to use these same exportable products to make operational decisions. USTRANSCOM uses Single Mobility System software to accomplish integration functions, and the command is focused on capabilities rather than promoting specific software programs.

The goal is to eventually build briefing charts with drill-down capabilities to make them usable at all levels of a staff. They display a full array of information: manifests for aircraft en route and vessels under way, equipment or supplies currently in the strategic or theater pipelines, and cumulative supplies moved into the theater.

Ideally, the standard for the manual inputting of logistics data should be "one time at the point of origin," which later saves countless hours of work and increases responsiveness of the distribution system. If the knowledge-wall approach is adopted throughout the logistics community, the consequent linking of increasing numbers of databases will reduce manual inputs. Eventually, senior leaders should ban service-centric programs that might be advertised as supporting joint systems but that actually serve immediate and narrowly focused interests. The greater joint-distribution interests must take precedence.

Conclusion and Recommendations

Over the years, tactical-level logistics have evolved separately from strategic-level distribution processes. Today they are partially unlinked. Unity of command must be established so the DPO can bring strategic, operational, and tactical logistics back into alignment. Only then will they form an integrated whole to serve the needs of forward-deployed units.

Designation of a single process owner for distribution was a signal from senior civilian leaders that significant changes needed to be made in large-scale logistical operations. To carry out its DPO responsibilities, USTRANSCOM will need a forward-staff presence in-theater to conduct strategic-level assessments and provide distribution options to the combat commanders. USTRANSCOM must partner with the services, unified commands, and DLA to reorganize staffs and create line units from existing force structure. JOPES must be fixed to better enable fundamental changes to military logistics and other war-fighting systems. Information technologies with outdated architectures should be replaced. The remaining logistical programs should also be cobbled together to create a common operating picture and gain near-real-time assessments of personnel, equipment, and supplies in the logistics pipeline. Command relationships need to be examined and possibly realigned so that DPO responsibilities are commensurate with DPO authority.

The DPO presents a new paradigm for the logistics community. First, tying strategic and operational logistics together into a coherent, end-to-end whole is the key to effective distribution. To measure progress, we must adopt new effects-based metrics that accommodate a systems approach to logistics. Second, logisticians at all levels will have to remain focused on tactical warfare and be willing to let go of peacetime efficiencies for the sake of wartime effectiveness. Bold leadership is needed to achieve results, build trust in the distribution process, and revolutionize our logistical processes to support future campaigns in the war on terrorism. ❑

Notes

1. Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (as amended through 5 January 2007), http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf, defines *tactical level of war* as "the level of war at which battles and engagements are planned and executed to achieve military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives."

2. The distribution pipeline and supply chain management are two different concepts. The distribution pipeline is a portion of overall supply chain management. This article focuses primarily upon the distribution pipeline, but the subject cannot be discussed in isolation from supply chain management. They are interrelated and affect each other's efficiencies. The responsibilities of the DPO do not include many aspects of supply chain management performed by the services, such as forecasting, levels computation, and stockage policies. Logistics, supply chain management, and resource provision do not equal the distribution pipeline or pipeline management. JP 1-02, *Department of Defense Dictionary*, provides the following definitions:

> **distribution pipeline —** Continuum or channel through which the Department of Defense conducts distribution operations. The distribution pipeline represents the end-to-end flow of resources from supplier to consumer and, in some cases, back to the supplier in retrograde activities. . . .
>
> **logistics —** The science of planning and carrying out the movement and maintenance of forces. . . .
>
> **supply chain management —** A cross-functional approach to procuring, producing, and delivering products and services to customers. The broad management scope includes subsuppliers, suppliers, internal information, and funds flow.

3. JP 1-02, *Department of Defense Dictionary*, provides the following definitions:

> **operational level of war —** The level of war at which campaigns and major operations are planned, conducted, and sustained to achieve strategic objectives within theaters or other operational areas. Activities at this level link tactics and strategy by establishing operational objectives needed to achieve the strategic objectives, sequencing events to achieve the operational objectives, initiating actions, and applying resources to bring about and sustain these events. . . .
>
> **strategic level of war —** The level of war at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) strategic security objectives and guidance, and develops and uses national resources to achieve these objectives. Activities at this level establish national and multinational military objectives; sequence initiatives; define limits and assess risks for the use of military and other instruments of national power; develop global plans or theater war plans to achieve those objectives; and provide military forces and other capabilities in accordance with strategic plans.

4. Tim Kauffman, "DoD Told to Shape Up: OMB and Congress Order Overdue Management Fixes," *Federal Times*, 9 May 2005, 1.

5. Blue force trackers enable ground troops to communicate using text messaging and track friendly/enemy forces. Trackers are designed to increase combat effectiveness and reduce friendly-fire incidents. Combat identification panels (CIP) are affixed to tracked and wheeled vehicles to identify them as friendly forces. They are 1/8" thick by 24" high by 30" long and are composed of low-emissivity thermal tape. CIPs are attached flat against vehicle sides and top decks, so when gunners view them through thermal sensors, they see a contrasting cold spot against the hotter surface of the vehicle.

6. These warehouses are stocked with supplies that are shipped overseas using strategic sealift instead of expensive airlift. As of June 2005, these initiatives and others have reduced the cumulative averages of DOD cargo moved by air to the USCENTCOM area of operations from 18 percent since 9/11 to 13 percent since October 2003. Author's personal papers—documentation of his service as chief, Joint Operations Division, USTRANSCOM, Scott AFB, IL, August–December 2004.

7. Author's personal papers—documentation of his service as the deputy C4, CFLCC, Camp Arifjan, Kuwait, August 2003–August 2004.

A Model for Managing Decision-Making Information in the GIG-Enabled Battlespace

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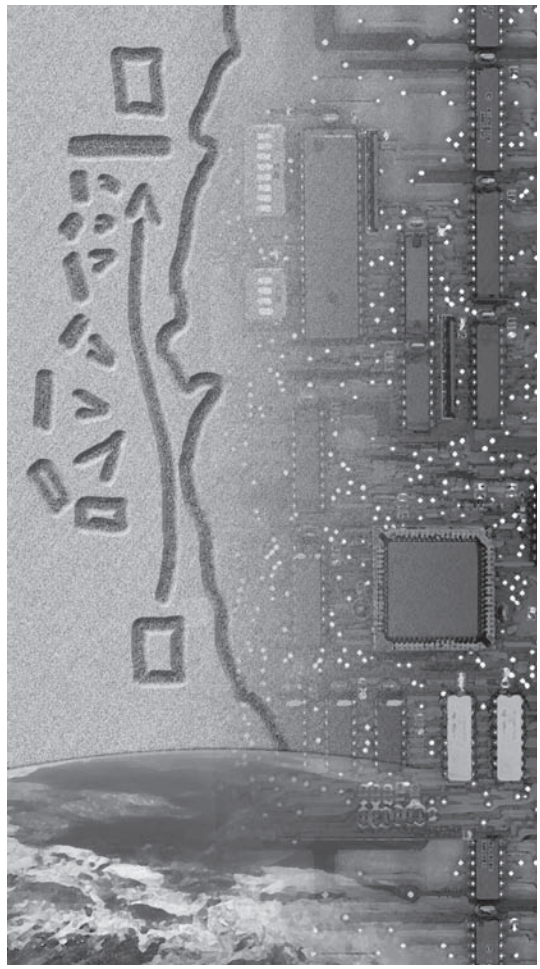
Editorial Abstract: The Defense Department is transforming information-technology systems into a Global Information Grid (GIG) that will connect sensors to weapons systems and provide unprecedented situational awareness. The authors suggest that if not properly implemented, the GIG may overwhelm war fighters with information presented at the wrong time, at the wrong level of detail, and without proper analysis. This article proposes a model to direct the flow of information in the GIG.



THE DEPARTMENT of Defense (DOD) is in the midst of transforming its vast collection of information-technology systems into an interconnected Global Information Grid (GIG), which will ultimately connect sensors to weapons systems, enable personnel to share information at will, and provide unprecedented levels of situational awareness to commanders at all levels. However, if we do not implement the GIG with a proper level of restriction on the flow of information, war fighters risk being overwhelmed not only by too much information but also by information presented at the wrong time, at the wrong level of detail, and without proper analysis and interpretation. This article proposes a model to prevent this situation by directing the flow of information based on its classification level, integrity, and relevance to the end user.

The Global Information Grid

In response to increasing difficulties associated with sharing information between various platforms and information systems operating in the joint environment, the DOD created the concept of the GIG.[1] DOD policy defines this grid as "a globally interconnected, end-to-end set of information capabilities, associated

processes, and personnel for collecting, processing, storing, disseminating and managing information on demand to warfighters, policy makers, and support personnel."[2] Established GIG policies also implement key components of the Clinger-Cohen Information Technology Management Reform Act of 1996, including information security, revised acquisition strategies, and best practices for handling data at all levels of the DOD.[3] Although many of the efforts in developing the GIG might simply entail the application of the DOD's best practices in acquisitions to the still-maturing field of information technology, the goal of achieving information superiority remains paramount—the primary objective of the overall GIG effort. Connecting personnel and equipment with advanced information-sharing tools will likely revolutionize our capabilities, but we must carefully manage the quality and volume of information presented to the war fighters of tomorrow.

The Sand Table

For centuries, military commanders have used various models to understand the battlespace. In the seventeenth century, campaign planners used intricate, craftsmen-built scale models of fortifications to analyze points of vulnerability and routes of attack.[4] In the field, leaders have long used sticks and stones in the sand to rehearse maneuvers and depict unit locations and terrain. Aircraft and antiaircraft technology increased the complexity of the "sand table" by adding important air components to the planning process. New technology used in Operation Desert Storm provided commanders and bomb-damage analysts a live view from the cockpit and, in many cases, from the weapons themselves as they flew into targets. Today, command centers of all levels are equipped with large data walls, on which interesting computer or video feeds provide a constant flow of data. Live video from remotely piloted Predator aircraft feeds into air and space operations centers, giving commanders and intelligence analysts what some people call "Predator Crack" or "Kill TV" because of the display's ability to divert viewers' full attention away from their primary duties.[5] The frequently asked question concerning what shows on the displays and who has responsibility for the content raises an even broader and more important question about the future GIG-enabled command center: how will we manage all of the data available on all of the interconnected platforms?

Although the GIG's influence on the development and acquisition of weapons systems is evident in requirements for common data standards and supported communications protocols, the military services are actively developing ways to inject network technology everywhere. Army projects such as Future Force Warrior will provide each soldier with a complex array of networked information sensors and displays, reminiscent of the gear worn by the futuristic space marines in the science-fiction movie *Aliens*.[6] One scene in that movie depicts a frighteningly realistic scenario in which the team commander watches health monitors go silent as each member falls and the confusion of battle grinds his decision-making ability to a halt. Several years later, real commanders orbiting in Black Hawk helicopters over Somalia tried to command a rescue convoy through a decaying urban environment. The communications delay between the airborne command post and the trucks introduced chaos significant enough to confuse the convoy, effectively driving it into a dead end.[7] Future systems must be able to create a timely flow of critical information in both directions, and we need to establish processes to help us manage and respond to that flow effectively.

Because of the rapidly increasing volume of available information, numerous research projects now under way seek to design virtual environments that integrate, analyze, and display every piece of information in an immersive, four-dimensional battlespace, where mission planners and commanders can manipulate time and perspective to suit their needs.[8] One can easily imagine the demands placed on commanders trying to conduct a war from inside a virtual, real-time sand table with data from thousands of sources pouring in at incredible rates. Additionally, the GIG notion-

ally gives personnel anywhere in the battlespace the ability to have similar representations streamed to their locations by various means. An obvious hazard of this capability—beyond information overload—is the danger of commanders making tactical decisions based on data intended for a strategic perspective and war fighters on the ground adjusting their tactics based on information intended only for strategic planners.

The Problem of Inverted Perspectives

As prescribed in joint doctrine, planners design operations to follow the principles of war, which include surprise, simplicity, security, and unity of command.[9] Numerous historical examples illustrate how friendly or hostile knowledge of certain components of plans drastically altered the results of those plans. Still others demonstrate that reaction or failure to respond to evolving circumstances has a drastic impact on the operation and effectiveness of the leadership involved. Rather than explore the success and failure of operations with respect to the principles of war, we should consider the implications of operating a GIG-enhanced command center of the future.

For example, a suite of sensors programmed to detect personnel and vehicle movement could collect and report status for display on a command center's data wall, indicating maneuver by an unknown unit. If we can attribute this maneuver to a friendly special-operations mission planned and executed in secrecy, we should restrict access to this sensor data at the same classification level of the mission and not automatically display it on a data wall for viewing by personnel without an appropriate clearance. Conversely, if a similar sensor suite detected the footsteps of an individual in a restricted area, we should present the data collected by this sensor (probably not displayed on the same data wall) only to appropriate security personnel. Commanders directing their attention to an unprocessed data point like this could experience an *inverted perspective,* whereby a single piece of potentially irrelevant data diverts focus from the broader picture. Similar scenarios could illustrate how a tactical unit on the ground might see data intended only for a strategic view; any changes to the actions of that tactical unit might eliminate a key component of a strategic plan. We assert that such an inverted perspective constitutes a very real hazard of information that might exist in a GIG-enhanced battlefield.

In an ideal environment, we would deploy thousands if not millions of sensors across the battlespace to collect climate, audio, video, and electromagnetic signal data. Additionally, airborne command and control (C2) assets would compose an integrated picture of the battlespace. Current processes and tools such as air tasking orders help deconflict the airspace, but some operations conducted on the ground or at sea might not be coordinated with all components. A robust sensor net would provide a bridge between these dissimilar components of the battlespace to help prevent incidents of friendly fire, but the composite picture would likely not have relevance to some war fighters. In total, the amount of information collected will be immense, and the details of the battlespace available for display will prove tempting to war fighters and leaders at all levels. GIG-enhanced aircraft will have access to a vast store of information. However, with this comes the possibility that unprocessed sensor data might make its way into the cockpit, forcing pilots with increased sensitivity to collateral damage and escalation to change tactics, select alternate targets, or abort the engagement.

Ground units would need time to analyze the data from sensors detecting a nearby firefight before determining the location of units in the area and perhaps requesting additional airborne or spaceborne surveillance. Those units not aware of friendly forces in covert operations could alter their tactics or maneuver in response to indications of a nearby firefight—particularly if sensors indicated activity in a unit's area of responsibility. Hopefully, all parties in that area would have already received briefings on operations to an appropriate level of detail, but any GIG-enhanced capabilities for examining additional sensor data

could affect the commander on the ground in a number of ways—hence the need for clear rules for using this data in order to avoid inverted perspectives.

One could present any number of examples demonstrating avoidance of inverted perspectives by limiting exposure of data in the GIG, and still more examples could illustrate that any restrictions on information flow could reduce flexibility. Considering both sides of this argument, we assert that we should place limits on the places that *automatically* receive data as well as on the people authorized to access it. We must also consider that some platforms—as William T. Hobbins, a lieutenant general at the time, indicated during an interview with *Airman Magazine*—will produce data at different rates while operators in varying roles will consume data feeds at different rates, thus adding more considerations for a potential solution.[10] Clearly, this paints an amazingly complex picture with fuzzy and continuously evolving operational requirements.

Current Management of Information Flow

We are all familiar with the classification levels defined by the National Security Agency. Only users holding a secret or higher clearance and having a need to know can read data protected by a secret classification level. Similarly, readers with a high classification level can normally read any material at or below that level, assuming they have a need to know. In a conceptual, GIG-enabled virtual command center, we could classify information specific to a sensitive operation at a sufficiently high level to prevent those who hold lower-level classifications from reading the data. Furthermore, we could reserve display of data relevant to those classified operations for individuals with the required need to know. Additionally, we must assure that data on a command center's displays remains at the lowest clearance level of personnel with access to those displays.

Using a well-disciplined approach, we could properly secure or sanitize data from all sources to prevent users from seeing information not cleared for their consumption. Thus far, however, we have addressed only the proper treatment of data with respect to confidentiality. The integrity or trustworthiness of the data is also of prime importance, particularly in urban areas, where we have a great need for very accurate and timely data and, therefore, a need to evaluate raw data rapidly and prepare it for presentation to leadership. Normal data-classification techniques do not classify information based on its integrity, so we need to explore a method to help categorize data that could cause an inverted-perspective hazard in a GIG-enhanced picture of the battlefield, whether it is unprocessed remote-sensor data or imagery not yet evaluated by intelligence personnel.

Biba's Integrity Model

While working on an Air Force computer-security research project in 1977, K. J. Biba wrote what has since become the seminal paper on information integrity.[11] In it, he examined a method for maintaining the validity of data on information-processing systems, choosing to use the concept of *integrity* as a measure of information's validity. That is, information from a known, trustworthy source would have high integrity, while information based on rumor or from unknown sources would have low integrity. Similarly, password-protected information stored in electronic form would have higher integrity than data available for reading or editing without any access controls at all. If we extrapolated this concept for application to our GIG-enhanced command center, the integrity of the reader—that is, the reader's response to data—is influenced by the information consumed. New and startling information will affect the reader's behavior to varying degrees, based on the integrity of the source of that data. For example, a commander might decide to take some risks after reading information from a reliable source but not do so in reaction to the same information from an unreliable source. Similarly, one should not

interpret a report that included a data point from a low-integrity source as factual.

In the strict formulation of Biba's integrity model, three rules apply to reading, writing, or acting upon information from sources of various integrity levels. This model refers to things that can create and consume data as subjects and to products produced as objects. The rules rely on the notion of dominance, which implies some sort of permission granted to the dominant over the subordinate, whether that permission involves reading, accessing, or in some way modifying something. Using security clearances to demonstrate dominance, Biba shows that one object dominates another when its security clearance level is the same as or higher than that of the other object. For example, a secret clearance dominates secret or unclassified clearances, while top secret dominates top secret, secret, and unclassified clearance levels. When a subject dominates an object, the subject can read the object. If the subject does not dominate the object, the subject cannot read the object, just as someone with a secret clearance cannot read a top-secret document but can read secret or unclassified documents. Biba uses the concept of integrity and the rule of dominance to determine access controls in his computer-security research. The three integrity-preserving rules from Biba's integrity model are as follows:

1. A subject can read an object if and only if the object's integrity level dominates (is greater than or equal to) the subject's integrity level. That is, a subject can only read objects with equal or *higher* integrity.

2. A subject can write data into an object if and only if the subject's integrity level dominates the object's integrity level. Since the subject must have integrity at least as high as the object, the object's integrity is preserved.

3. A subject can execute (or direct the action of) another subject if and only if the first subject's integrity level dominates the second subject's integrity level. Someone of lower integrity cannot operate on someone else's behalf.[12]

In plain terms, rule one means that a subject can read an object only if the data will not have a deceptive or misleading effect on the reader. In our command center, we would not normally present data (an object) to the commander (a subject) unless the data had undergone proper vetting using prudent processes. Rule two means that some data source of a lower integrity level can't inject information that one might interpret as accurate or valid. Again using our command center example, we would not display raw data on the data wall until we have validated it, much like we would not present the actions of a unit to the commander as confirmed results until we have conducted proper battle damage assessment or a mission debriefing. Rule three would prevent unnecessary reaction to deceptive acts or preprocessed data from sensors, which could prove useful in avoiding inverted perspectives.

Together, these rules address some of the concerns we have explored so far with respect to unprocessed sensor data. Therefore, it seems reasonable that application of the Biba integrity model to a notional command center can form the basis of a system implemented to help prevent inverted perspectives. This model could assist in defining specific requirements for automatically filtering information and controlling access, but commander flexibility and the ability to share information would experience necessary limitations to some degree. Joint doctrine emphasizes information dissemination as a key component of intelligence support: "Intelligence will play a critical and continuous role in supporting warfighting. Advances in computer processing, precise global positioning, and telecommunications will provide joint force commanders . . . with the capability to determine accurate locations of friendly and enemy forces, as well as to collect, process, and disseminate relevant data to thousands of locations."[13]

A key point entails the use of the word *relevant* to describe the dissemination of data. Further discussion in doctrine defines this term as a key attribute of intelligence that describes the scope of intelligence gathering and sharing efforts; moreover, it delineates who needs specific pieces of information and, more impor-

tantly, who shouldn't be distracted by irrelevant data.[14] Therefore, a model that combines the DOD's traditional classification levels with data integrity *and* relevance holds the key to formulating policy for data-sharing mechanisms developed for future command centers.

Classification, Integrity, and Relevance

The war fighter's need for relevant and accurate information is thoroughly understood and well defined in doctrine and operational art, but defining the scope, sources, and format of the data would require continuously updating vast amounts of information. Efforts to build systems that provide data in predefined formats or follow predefined message-sharing rules normally result in products difficult to integrate or expensive to update. To avoid the problems of updating systems to keep pace with continually evolving technologies, we propose to control information flow using a data-sharing mechanism based on classification, integrity, and relevance. The following summarizes our definitions so far:

- *classification*: a rating assigned to information in order to provide appropriate protection and restrict access
- *integrity*: a measure of a subject's or object's trustworthiness
- *relevance*: a measure of applicability to a purpose or a customer
- *dominance*: the condition in effect when one entity has the same or higher rating as another

Our information-sharing mechanism must enable meaningful and adaptive information-sharing capabilities within a command center. Consider such a center staffed with personnel of varying clearances and areas of functional expertise, similar to other command centers such as wing command posts, expeditionary operations centers, or air and space operations centers. As in Biba's model, both personnel and systems can create and consume data and are referred to as subjects, while the documents or virtual products produced are referred to as objects. Our information-sharing mechanism assigns three ratings to every subject and object: classification, relevance, and integrity.

Suppose the classification levels for subjects and objects are unclassified, for official use only, secret, or top secret. For simplicity's sake, our model will not address clearance caveats or clearances for personnel from other countries, but we could readily incorporate them. The relevance and integrity levels of subjects and objects will be low, medium, or high. Personnel-classification levels normally do not change over time, but personnel can induce and experience changes in integrity levels and will produce objects of varying relevance levels. Similarly, documents and processing systems often have the same ratings as their content or inputs. For our command center, we propose the following rules, which govern all information-sharing transactions and which we enumerate below prior to discussing their implications in the next section:

1. A subject can read or process an object if and only if the subject's classification level dominates the object's classification level.
2. Initially, all trusted subjects have a high integrity rating, and all subjects and objects are assigned appropriate classification ratings. All untrusted subjects have a low integrity rating.
3. The integrity level of a subject or object can be raised only through a well-controlled process.
4. When a subject creates an object, the created object will have an integrity level equal to the subject that created it, or if the newly created object contains information from other subjects or objects, in full or in part, the new object will have the lowest integrity level of the component information.

5. The relevance level of a subject or object is determined through another well-controlled process.
6. If a subject reads an object of a lower integrity level, the subject's integrity level will take on the object's lower integrity level. The subject can return to its previous integrity level only in accordance with the process defined in rule three.
7. A subject can process and then manually or automatically forward an object to another subject only if the forwarded object dominates the receiving subject's integrity and relevance levels and if the receiving subject's classification level dominates the object's classification.[15]

Rule Analysis and Clarification

Rule one ensures observation of the fundamental requirements of need to know, security, and proper access-control mechanisms.

Rule two ensures that personnel and information-processing systems can share information following our basic rules. Trusted subjects include sources trusted in a wide context, whether that involves coalition partners; our own personnel- and information-processing systems and equipment; and intelligence, surveillance, and reconnaissance resources. Untrusted subjects include those systems and personnel not under the command center's control, possibly including subjects such as the domestic and international media, informants, or any source of questionable origin.

Rule three dictates establishment of a formal process to change the integrity level of a subject or object. The intelligence community uses similar procedures to mark the level of trust in an intelligence resource; multiple sources of lower integrity levels could provide enough corroboration to support raising the integrity level of a subject or object, but the process of doing so should be well understood and performed by a designated entity. This process will obviously represent one of the most important components of this model since improperly raising integrity levels of a poor information source could compromise the entire scheme.

Rule four requires that personnel or systems creating information attribute the source accordingly and properly mark data at the appropriate integrity level. Doing so will ensure that a receiver places the suitable level of trust or skepticism on the information. New information compiled from multiple sources will not automatically assume the integrity level of the subject compiling the information; instead, the integrity level of the new object will reflect the lowest such level of the compiled information until application of the process defined in rule three.

The process suggested by rule five can be more flexible than that in rule three, depending on the role of the receiving subject. For example, a tactical ground unit would have a much smaller "sphere of relevance" than would a C2 aircraft orbiting over an area of responsibility. The ground unit would typically be interested in information about an opponent's nearby ground forces, in-range artillery units, or status of aircraft flying close air support, but not in mission tracks of long-range friendly aircraft, threats from enemy air defenses, or air-refueling tracks. However, the C2 aircraft might want to display locations of friendly ground forces in the area of a specific operation. Some process must define an appropriate sphere of relevance for each subject, based on mission needs. At the operational level, each subject should also be able to customize its sphere of relevance to assure the addition of data of interest or the removal of information deemed no longer pertinent.

Rule six prohibits the forwarding of any low-integrity information as higher-integrity information without proper analysis and consideration. Similarly, personnel who read low-integrity information must be careful not to make decisions or pass on the information without putting it into proper context. This particular rule is more difficult to implement for personnel than for data-processing equipment. For example, one could interpret a system's report of erratic and illogical readings from a sensor as a malfunction; additionally, one could include the appropriate caveats

with low-integrity data added to a report. However, when the subject is a person rather than an automated system, preventing him or her from acting on or up-channeling information without regard for its lower integrity will present a problem.

Rule seven ensures the proper filtering of information in accordance with integrity and relevance rules. A tactical display is useless if it exhibits irrelevant or misleading information at the wrong time, and unprocessed or incomplete data could cause premature or incorrect decisions. The final caveat guarantees that sensitive operations are not compromised—data must undergo sanitizing or proper declassification before transmission to subjects not involved in the operation. In effect, this rule provides the "push and pull"—preventing information overload from unneeded automated pushes while preserving flexibility for pulling useful data.

Back in the Command Center

In order to implement these rules in a command center, we need to completely automate some processes, let personnel in various career fields or leadership positions handle the others exclusively, and see that both systems and personnel implement several rules. After the transfer of objects to paper form, traditional processes such as classification controls and need-to-know restrictions become personnel responsibilities, while various mechanisms can restrict the flow of digital information. Rules three and five, however, require humans to interpret data and make changes to integrity and relevance levels, based on that interpretation. Intelligence and operations personnel will normally be in the best position to change these levels, depending on the specifics of the situation. In order to enforce both rules, personnel must have a good understanding of the processes and must properly restrict mechanisms that effect changes to integrity and relevance.

Conclusion

Clearly, we operate in a politically complex environment, and many operations occur in the focal point of a 24-hour news cycle. Missed opportunities to engage high-value targets and incidents of collateral damage have equal probability of becoming headlines; both can raise questions about our military effectiveness. As a result, a commander's appetite for information will continue to grow, as will demands that future systems be interconnected via the GIG. Our efficiency and ability to rapidly fuse, analyze, and convert raw data into actionable intelligence will depend on the capabilities of future systems and the processes that govern their implementation. We believe that the classification, integrity, and relevance rules described above will help guide the development of systems for maximizing data fusion and avoid the pitfalls of conditions such as inverted perspectives. Because of the benefits associated with these rules, we need to utilize a simulated command center and information-processing systems to develop them significantly. ❑

Notes

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3. *Clinger-Cohen Information Technology Management Reform Act of 1996*, 40 *US Code* 1424, 104th Cong., 2d sess., 3 January 1996, http://www.cio.gov/Documents/it_management_reform_act_Feb_1996.html.

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8. House, *Statement of Mr. James B. Engle, Deputy Assistant Secretary of the Air Force (Science, Technology and Engineering), to the House Science Committee on Air Force Information Technology Program*, 107th Cong., 2d sess., June 2002, http://gop.science.house.gov/hearings/full02/jun24/engle.htm.

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12. K. J. Biba, *Integrity Considerations for Secure Computer Systems*, Technical Report ESD-TR-76-372 (Bedford, MA: USAF Electronic Systems Division, April 1977), 33.

13. JP 2-0, *Doctrine for Intelligence Support to Joint Operations*, 9 March 2000, I-1, http://www.dtic.mil/doctrine/jel/new_pubs/jp2_0.pdf.

14. Ibid., II-15.

15. Steven B. Lipner, "Non-Discretionary Controls for Commercial Applications," in *Proceedings of the 1982 IEEE Symposium on Privacy and Security* (Oakland, CA: Institute of Electrical and Electronics Engineers, April 1982), 2–10.

We stand ready to conduct a large-scale, long-duration irregular warfare campaign as an integral part of the Joint Team, to include counterinsurgency, security, stability, transition and reconstruction operations.

—2007 U.S. Air Force Posture Statement

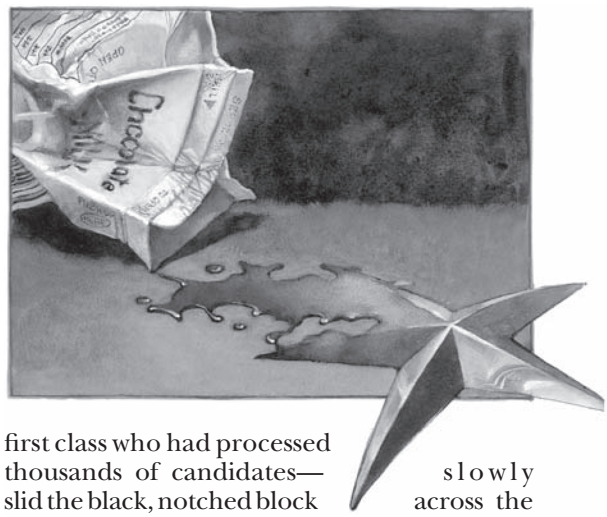
What Difference Can You Make?

CMSgt John P. Hearn, USAF, Retired*

AIR FORCE SUPERVISORS commonly reward their subordinates for outstanding performance. The decorations they bestow represent tangible expressions of gratitude. Oftentimes, however, supervisors never realize the effect they have had on their subordinates.

The finest compliment I ever received came from one of my former subordinates. When I supervised him, he was an Airman first class; now he's a senior master sergeant. He once told me that, had it not been for me, he would have left the Air Force to become a civilian. I did not save his life in a moment of glory; on the contrary, I had several interesting talks with him concerning his demeanor and his methods for communicating with other Airmen of varying ranks. As a law-enforcement desk sergeant, he frequently had opportunities to excel when conversing with other people on base. Since we were stationed together during a "short tour" in Korea, I had only a few months to interact with him before he was reassigned. Years later, he told me how I had influenced his life—that I had inspired him by my example. What a feeling! In essence, I succeeded at one of the jobs the Air Force paid me to do because part of a leader's job involves developing subordinates to be future leaders.

At times a person's actions influence the Air Force's mission far beyond the demands of his or her job description. For example, late in the spring of 1957 on the first day of candidate-prescreening orientation, a young man stood on a scale at the Air Force Academy clinic. The medical technician—an Airman



first class who had processed thousands of candidates—slowly slid the black, notched block across the measuring arm, stopping the block when the point of the arm had centered itself: "One hundred and fifteen pounds, Sir," he said. The doctor, a major, annotated a checklist on the candidate's medical record and commented, "You're not going to make it, kid. The minimum required weight for admission to the academy is 120 pounds. You have to meet that standard when you weigh out at the end of the week." Devastated at this news, the young man thought of his father, who had enlisted in the Army and served throughout World War II, winning a commission and finally retiring as a colonel. His father had high expectations for him and had expended a great deal of effort to win his appointment to the academy. How could he tell him of his failure to meet admission standards?

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Seeing the despair in the young man's eyes, the technician told him to wait outside the office; he came to see him when the doctor took a break: "Listen to me. Go over to the chow hall and see the mess sergeant. Tell him I sent you, and tell him about the problem you have; he'll take care of you."

At the academy's dining facility, the mess sergeant—overweight, unshaven, and inarticulate—patiently listened to the candidate's plight and said, "Okay kid, you just eat whatever I put on your plate." Over the next week, the sergeant made a point of filling the young man's plate with pasta, fats, bananas, and carbohydrates—food that, in today's Air Force, would give a dietary technician a coronary. Although the candidate stuffed himself at every meal, the intense physical activities packed into the orientation program prevented him from gaining weight. By week's end, the young man lay in bed contemplating his future and worrying about the next day's outprocessing physical.

Just before lunch, the candidate entered the doctor's office for his weigh-out. Earlier he had weighed himself, happily seeing that he was up to 120 pounds. Now, however, at the clinic he heard the technician announce, "One hundred and eighteen pounds, Sir." The doctor made his final mark on the candidate's medical record and turned his gaze upon him: "See, kid, I told you that you wouldn't make it." He then tossed the record into the wastebasket. In his anguish, the young man explained, "I had to do my final physical fitness exercises and the run this morning. I lost weight doing that." The technician followed him into the hall and handed him a quarter: "Go down the hall, and buy a carton of chocolate milk." Puzzled, the candidate asked him, "Why do you want a carton of milk now?"

"It's not for me; it's for you."

"Don't be ridiculous. I'm not thirsty right now."

The technician stared at the candidate as a parent would when disciplining a wayward child: "Listen, Mister, a carton of chocolate milk is one quart and weighs just over two pounds." After the young man returned with the milk, the technician watched him drink it all down and then approached the doctor:

"Sir, would you do me a favor and weigh that last candidate one more time?"

"I already marked him as a failure. He didn't make the weight."

But the technician persisted, so the doctor agreed to his request. As the candidate once more stood on the scale, the technician slid the weighted block across the measuring arm until the pointer centered itself.

"One hundred and twenty pounds, Sir."

"You're very lucky, young man. You just barely made it."

Having said that, the doctor made a new mark on the record and placed the candidate's file in the basket marked "ACCEPTED."

The candidate graduated 12th in his class in 1961, and throughout his illustrious 33-year career, he flew F-4 Phantom II aircraft over the triple-canopied jungles of Southeast Asia in support of infantry soldiers far below. Returning to the States, he served in a variety of posts during the following years, including choice assignments at the Pentagon. In addition to fighters, he also flew training aircraft, C-141 transports, and, later, B-52 bombers. He became a wing commander and was promoted to general. On one memorable inspection at a northern-tier base, as commanding general for Strategic Air Command's (SAC) inspector-general teams, he got out of his aircraft and asked for a vehicle, as was his custom. The wing commander handed him an agenda for his visit, but the general had his own agenda. Without the usual entourage, he drove along the flight line and stopped by an aircraft that an Airman was servicing. Stepping out of the car into the freezing wind, the general asked the Airman how he could service the aircraft wearing heavy arctic mittens. "It's not very easy, Sir, but it's so cold out here that if I touch the metal with my bare hands, my skin will freeze to it." The general then radioed his inspection team to rendezvous back at his aircraft; they would inspect some other base farther south instead. The wing commander told him he could not do that. Smiling, the general said, "Colonel, it's not safe out here to work on aircraft. I'll come back at another time when weather conditions are better. Meanwhile, if you disagree with my decision, call General Davis at Head-

Gen George L. Butler began his Air Force career in 1961, retiring in 1994.

quarters SAC and tell him." With that, the inspection team departed.

During the general's tenure at the Pentagon, some members of the East German military who were inspecting a site in the Warsaw Pact area killed an Army major. The general received a tasking to write a policy directive detailing procedures for notifying Warsaw Pact forces of all future inspection requirements. These procedures also applied to Soviet-bloc forces when they conducted inspections of installations in the North Atlantic Treaty Organization (NATO). In a formal ceremony, the chairman of the Joint Chiefs of Staff and his Soviet counterpart approved and signed the general's policy directive.

One of the greatest moments in the general's career occurred when he became SAC's combatant commander—its last commander, as a matter of fact. He also orchestrated the standup of US Strategic Command after the collapse of the Soviet Union and the inactivation of SAC, Military Airlift Command, and Tactical Air Command. During his stay at Offutt AFB, Nebraska, he worked tirelessly to improve living conditions of personnel who lived on and off base and to upgrade Offutt's fitness center. In short, he was a leader who took care of the people who took care of the mission. I've mentioned only a few of his accomplishments in a very productive career that spanned more than three decades. But this account not only mentions some of the successes of Gen George L. Butler, the candidate-made-general, it also stresses the effect that one person can have on another as well as the benefits that accrue from that person's influence.

The general would be the first to say that, had it not been for the concern and consideration shown him by two enlisted members back in 1957, he never would have had either the opportunity or authority to help the enlisted force. His successes not only benefited Air Force members but also favorably affected the forces of our sister services and NATO allies. The young medical technician and the mess sergeant may never know just how important a contribution they made to the defense of our nation. They will never receive a medal or plaque to commemorate what they did for the Air Force. If the candidate whom they helped later saved a life in Vietnam, those two enlisted members also had a hand in saving that life. If the policies and procedures the candidate eventually developed to deal with a nuclear-armed opponent prevented misunderstandings and, possibly, a nuclear incident, then those men also helped make the world a safer place. If the general-to-be opened base housing for junior enlisted members to soften the economic burden of raising a family, then those two men deserve some of the gratitude of those personnel.

We all know that combining hydrogen and oxygen produces water, but not everyone knows that it takes a catalyst to join those two elements. In this story, many people may know about General Butler and his accomplishments, the results of his actions, and the way some people have benefited from those actions. However, very few of them know that none of the general's accomplishments could have occurred without the efforts of two enlisted members, acting as catalysts, who went out of their way to help someone else. The general tried unsuccessfully throughout his career to find those two caring men so he could thank them. I hope that the readers of this journal can now appreciate them as well as the countless others who silently make differences in our lives. Can *you* make a difference? Probably more than you will ever know. ❑

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Leading Change by John P. Kotter. Harvard Business School Press (http://www.hbsp.harvard.edu/b02/en/books/books_home.jhtml), 300 North Beacon Street, Watertown, Massachusetts 02472, 1996, 208 pages, $26.95 (hardcover).

Nothing endures except change—the only constant. Clearly, only in effective transformation does one find tangible security and the realization that those who fail to improvise face an unenviable future. In *Leading Change*, Prof. John Kotter, whom this reviewer interviewed at the Harvard Business School, has written a most thorough, insightful, and provocative process assessment for effecting organizational renewal. This superb, timely, and practical book is a must-read for anyone in a leadership position who is engaged in transformation and development of reengineered organizations for the twenty-first century. Quite simply, *Leading Change* is the best book on this subject published to date. This intensive, well-written volume provides an excellent synthesis for leading and managing an acceleration process to bring about change. Dr. Kotter presents a model designed to drive change from small increments to dramatic shifts and thus adjust organizational systems and structures to better meet mission requirements.

Part 1 of *Leading Change*'s three parts addresses the change problem and its solution. Part 2, the heart of the book, considers the author's eight-stage process for dynamic and positive change. Part 3 discusses the implications of change for the twenty-first century.

Part 1 includes Dr. Kotter's analysis of why transforming organizations fail. He identifies leadership as the engine that drives redirection, maintaining that a purely managerial mind-set will inevitably fail to produce constructive revisions, regardless of the quality of people involved. Some key consequences of failure in transformational-change efforts, primarily based on a lack of leadership, include the following: reengineering takes too long and costs too much, promised programs do not deliver hoped-for results, and new strategies are not implemented well. However, these failures are not inevitable. With a heightened sense of awareness of the need for change and the application of relevant leadership competencies, one can avoid these failures or at least greatly reduce them. The key to preventing failure resides in acquiring a deeper and first-rate understanding of why organizations resist change, having a compellingly dedicated champion who sponsors change, and making sure that the practices to complement and reinforce change are comprehensive and based on a process model such as that contained in part 2 of Dr. Kotter's book.

In part 2, the author outlines an exceptionally workable and relevant eight-stage process for creating redirection. He argues that successful transformations will not happen easily and that one must create a detailed road map which guides the way. His powerful process for creating major reform makes a unique contribution to better understanding renovation leadership. It includes the following steps:

1. Establishing a Sense of Urgency. Examining current realities and identifying crises, potential crises, or major opportunities for improvement.

2. Creating the Guiding Coalition. Putting together a group with enough influence to lead the change and getting the group to work together as a team.

3. Developing a Vision. Creating a vision to help direct the change effort and formulating strategies for achieving that vision.

4. Communicating the Change Vision. Constantly communicating the new vision, strategies, and behavior expected within the organization.

5. Empowering Broad-Based Action. Getting rid of obstacles that prevent change, reshaping systems or structures that undermine the change vision, and encouraging risk taking and nontraditional ideas, activities, and actions.

6. Generating Short-Term Wins. Planning for visible improvements in performance as well as recognizing and rewarding people who made the wins possible.

7. Consolidating Gains and Producing More Change. Using increased credibility to change all systems, structures, and policies that do not fit together and do not meet the transformation vision. Recognizing people who can implement the change vision and reinvigorate the entire process.

8. Anchoring New Approaches in the Culture. Encouraging more and better leadership as well as more effective management. Articulating the connection between new behaviors and organizational success and ensuring the succession of continued leadership development.

After considering the organization of the future, leadership, and lifelong learning, the author contends in part 3 that the twenty-first-century organization will become less bureaucratic, contain more effective customer data systems, and be more risk tolerant as well as more open and candid. He emphasizes the importance of lifelong learning and enhanced leadership skills to success in the future.

In summary, given the inevitability of change, we must embrace it if we wish to successfully meet the challenges of the present and the future. In *Leading Change*, Dr. Kotter provides us with a detailed road map that highlights potential dangers and offers solid advice to all leaders and managers trying to orchestrate effective change throughout their organizations—the principal theme of this book.

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Air Power in the New Counterinsurgency Era: The Strategic Importance of USAF Advisory and Assistance Missions by Alan J. Vick et al. RAND (http://www.rand.org/publications/index.html), 1700 Main Street, P.O. Box 2138, Santa Monica, California 90407-2138, 2006, 204 pages, $25.00 (softcover). Available free from http://www.rand.org/pubs/monographs/2006/RAND_MG509.pdf.

The short title of this RAND monograph gives the impression that its authors will enlighten readers as to characteristics of the newest generation of counterinsurgency (COIN) warfare and details of airpower's role in this novel environment—certainly a topic of great interest to military-aviation scholars, given recent operations. Despite providing a concise recap of COIN's political and military characteristics, the work describes timeless principles—not novel ones. Although the study does (lightly) treat various applications of COIN airpower, it expends much effort somewhat narrowly promoting the expansion of the Air Force's elite foreign air-advisory unit as the most cost-effective means of combating budding insurgencies of the future.

The pseudobeguiling title aside, the work has only a few faults and much to offer the reader concerning COIN. The authors spend a majority of their time clearly defining and categorizing insurgencies, detailing COIN principles, and discussing grand strategic options for COIN. They advocate a "new" strategy of "precautionary" COIN—very limited military intervention at the earliest stages—as the most cost-effective means of combating insurgency (p. 70). Even though the study does not eliminate the potential necessity for "remedial" COIN, whereby the host government requires direct outside assistance to put down an insurgency, it focuses primarily on changes needed to enhance the Air Force's capabilities to execute a robust, precautionary COIN strategy.

The authors introduce an Iraq-style situation, a so-called constabulary COIN, as a third option but take it no further than a concept in which an occupying power has removed the existing government and now must fight an insurgency while generating a legitimate replacement. This particular topic raised a hopeful eyebrow. Sadly, however, the authors avoid an opportunity to explore needed changes in airpower applicable to today's major challenges by tersely noting that "the occupying state should take what steps it can to limit the scale of the insurgency beforehand" (p. 72).

A case study on El Salvador's insurgency and an examination of considerations in the development of COIN capabilities highlight important issues for US military planners: that smaller footprints and closer contact are often preferable, that the host nation must win the political as well as military battle, that military restraint is a virtue, and that airpower offers important capabilities. The remainder of the work theoretically and methodologically details how the Air Force can affect an early insurgency best through institutional and bureaucratic initiatives and the growth of air advisers, using the 6th Special Operations Squadron as a model.

In sum, I was impressed by the discussion of military power's application to insurgency but deflated to discover that the prescription for airpower amounted to speeches, new Air Staff offices, courses in developmental education, and an order-of-magnitude increase for the 6th Special Operations Squadron. Granted, increased operational air-advisory capability constitutes a valid recommendation for precautionary COIN, but the study omits discussion of relevant airpower options in all types of counterinsurgencies. If "the optimal force mixes for warfare against regular [i.e., conventional] and irregular [i.e., COIN] adversaries differ even more today" (p. 60), then shouldn't the Air Force also consider developing a small but talented "model" COIN air force to strafe enemy insurgent positions instead of relying on fourth-generation (soon fifth-generation) fighters costing $75 million (according to the Defense Department's *Program Acquisition Costs by Weapon System*, February 2006)? Where are the examinations of tough force-structure choices? Must US forces capable of flying, employing, and instructing from third-generation attack platforms be limited to select special operators? Unfortunately, *Air Power in the New Counterinsurgency Era* stops short of addressing these options. I would read this monograph again for the excellent exposition of not-so-new COIN principles but look elsewhere for novel, innovative, and broadly applicable airpower solutions.

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Fortress France: The Maginot Line and French Defenses in World War II by J. E. Kaufmann and H. W. Kaufmann. Praeger (http://www.greenwood.com/praeger.aspx), Greenwood Publishing Group, 88 Post Road West, Westport, Connecticut 06881, 2005, 220 pages, $49.95 (hardcover).

The Treaty of Versailles ended World War I, but it did nothing to prevent World War II. Shortly after it was signed, European countries began considering plans for the next inevitable war. France initially created offensive plans but found them unrealistic due to manpower shortages created by World War I. In 1929 André Maginot, the French minister of war and a veteran of Verdun, began pushing for the creation of massive defenses that would cut off German invasion routes into France. He preferred physical structures because, as he said, "concrete is better . . . and is less expensive than a wall of chests" (p. 15). The wall that France built would carry his name. If only it had worked.

After World War II, one encountered much talk describing the Maginot Line as a white elephant that created a false sense of security—a "Maginot mentality" that doomed France to defeat. Authors J. E. Kaufmann and H. W. Kaufmann take the opposite stance, suggesting that the Maginot Line fulfilled its purpose and gave French authorities an opportunity to mass their combat power in the face of the Nazi onslaught. The authors posit that restrictive French doctrine limited subordinates' freedom of initiative, hemming in the French military's free thinkers. That argument, which the Kaufmanns state as a given, is certainly worthy of consideration, but this reviewer takes no position on it because the points are difficult to glean from this dense work.

Rather than a work of history or doctrinal analysis, *Fortress France* is predominantly an engineering study, packed full of detailed drawings and explanations of every aspect of the Maginot Line down to the smallest detail. For example, readers interested in the protective properties of reinforced concrete walls against artillery shells of various sizes will appreciate table 2-9 (p. 49), typical of the book's many tables. Whereas most military histories lack sufficient graphics and visuals, this one comes close to overdoing it, offering 33 tables and 54 figures—almost half the book.

In an effort to put the Maginot Line in context, the authors do offer a short opening chapter that discusses its origins as well as snapshots of the preparations and performance of France's air and naval arms. Additionally, they mention similar French defensive works in Africa known as the Mareth Line. However, one finds the book's one-page concluding chapter unsatisfying, serving merely as an endnote that will leave the reader wondering about the authors' true points.

Furthermore, *Fortress France* devotes itself completely to the physical properties of the wall. As the premise of the book implies, if the wall itself comprises only part of the story, then the authors should have placed more emphasis on the people involved. They do include all the major players but in such a way that fails to bring out their humanity—their sterile presentation simply doesn't excite the mind. This is a shame because the story of the Maginot Line presents such fertile ground for military thinkers—ground that *Fortress France* leaves untilled.

Oftentimes military history allows the student to establish parallels and extract lessons that apply to

modern military thought. Why read military history—or any history for that matter—if we cannot use it to understand our current condition? This book may do that—but without assistance from the authors. For example, might the lessons of the Maginot Line and France's reliance on it for defense serve as a warning to those who favor robots, unmanned vehicles, and smart weapons over human efforts? One will never know because the Kaufmanns fail to open the door to such thinking.

Finally, the book is just too expensive. For $49.95, one could buy several decent books on the subject. Overall, the extremely limited scope and excessive detail of *Fortress France*, together with other concerns mentioned above, limit its utility for the average reader.

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Las Metáforas de una Guerra Perpetua: Estudios sobre Pragmática del Discurso en el Conflicto Armado Colombiano by Fernando Estrada Gallego. Fondo Editorial Universidad EAFIT (http://www.eafit.edu.co/fondoEditorial), Carrera 49, no. 7, Sur-50, Medellín, Colombia, 2004, 173 pages, $10.00.

Las Metáforas de una Guerra Perpetua argues that opposing sides in Colombia's chronic guerrilla war articulate their political views through metaphor-based discourses that can be interpreted through systematic study. The author, Dr. Fernando Estrada Gallego, director of the Regional Studies Center at the Industrial University of Santander, Colombia, has published other works about the theoretical relationships among philosophy, language, and rationality. In this book, he applies complex philosophical concepts from Aristotle, Thomas Hobbes, Carl von Clausewitz, Michael Walzer, and many others to examine how discourses influence listeners and distort the public's perception of events. His analysis is convoluted and narrowly confined to Colombia, but serious students of information operations may find broader applications for his thoughts.

The author carefully dissects public statements made by guerrillas of the Fuerzas Armadas Revolucionarias de Colombia (FARC) and right-wing paramilitary groups to show how those organizations use metaphors to obscure and justify their violent actions. For example, the FARC euphemistically refers to indiscriminate mass kidnappings as "miraculous catches," a metaphor derived from the biblical verse "follow me, and I will make you fishers of men" (pp. 87–90). Members of the FARC thereby cast themselves not as kidnappers but as revolutionaries conducting religiously inspired acts. Colombian paramilitary groups use similar rhetorical devices. Dr. Estrada contends that these metaphors treacherously mask crimes by intellectually eroding the public's ability to use normal language to understand events. As he puts it, "The war's rhetoric has generated an unconscious reversal of the values we Colombians attribute to our shared daily reality, and this reversal corresponds primarily to changes in words and their meanings" (p. 123). His focus on the power of words reminds one of George Orwell's classic book *1984*, in which government deprives people of the vocabulary they need to articulate ideas that might challenge its absolute authority.

Readers unfamiliar with philosophy and rhetoric may find *Las Metáforas de una Guerra Perpetua* hard to grasp. They might also wonder whether the author's analytical method implicitly assumes that political discourses and metaphors really are subject to rational examination. Passions certainly run high during guerrilla wars, but if one accepts the Clausewitzian notion that war is the continuation of politics by other means, then political discourses should reflect deliberate strategies calculated to influence public opinion.

Employing metaphors during counterinsurgency is challenging yet important. This book offers useful insights, but some of its underlying assumptions seem excessively gloomy. Dr. Estrada paints a bleak picture of Colombian social and political conditions, lamenting how that country has "a deprived social culture with the world's highest unemployment rates, highest corruption rates, and most discouraging indices of social cooperation" (p. 31). One can hardly believe that Colombia is in such dire straits. The author also bewails the country's heterogeneous political and social systems in terms that might almost apply to the United States. Colombia certainly faces serious problems yet has managed to sustain democratic governance despite decades of guerrilla war—a remarkable achievement. Writing during Pres. Álvaro Uribe's first term, Dr. Estrada sounds a skeptical note about how the president would address Colombia's problems. President Uribe's impressive reelection in 2006 shows that he is a potent agent of national progress. Indeed, the author acknowledges that despite Colombia's problems, "we have a country filled with hope, challenges to barbarism, and enterprising spirit, with people capable of conceiving projects for a new order of communal living" (p. 37).

Even if his assumptions are too pessimistic for Colombia, Dr. Estrada's ideas have wider applicability than he claims. For example, like Colombian armed groups, al-Qaeda terrorists often try to legitimize barbarous acts by resorting to religious metaphors. The author's policy recommendations may also have international validity because if the Colombians can make democracy work, they can serve as a model for others. To counteract social and political fragmentation and lessen the attraction of armed groups, he calls for more integration of minorities into Colombian politics. He also advocates governmental decentralization to empower local authorities to address local grievances. These prescriptions could apply as well in Iraq and other countries seeking to unify disparate groups; however, one should use prudence in doing so because weak central-governmental authority characterizes failed states like Somalia and Afghanistan. Even in democratic countries faced with severe political disruptions, the ship of state needs a firm hand on the tiller.

Las Metáforas de una Guerra Perpetua, a theoretical treatise about what the US military calls information operations or strategic communications, holds particular interest because our experience in the global war on terror shows the importance of public attitudes. The book offers a conceptual lens for interpreting information campaigns in Colombia, but its basic ideas apply to information operations in general. Too abstract for the hands-on practitioner, it may nevertheless suit advanced theorists and strategists. Dr. Estrada provides just the sort of insights the Air Force needs as it embraces cyberspace operations.

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Inside the Iron Works: How Grumman's Glory Days Faded by George M. Skurla and William H. Gregory. Naval Institute Press (http://www.usni.org/press/press.html), 291 Wood Road, Annapolis, Maryland 21402, 2004, 256 pages, $32.95 (hardcover).

Inside the Iron Works, an interesting and useful book for Air Force readers, focuses on the personalities of and decisions made by senior management officials at the Grumman Corporation from the 1940s through the 1980s. Its premise, supported by the authors' anecdotes, maintains that Grumman failed as a defense manufacturing company because of mismanagement (i.e., bad decisions made) by these leaders.

A major aircraft (and later space vehicle) builder for the US Navy, Grumman was founded on the concept of building as safe a vehicle as possible to protect the pilot—even at the expense of aerodesign qualities that may have increased range and/or maneuverability. Indeed, "naval aviators christened Grumman Aircraft Engineering as the *Iron Works* because of the habit its battle-damaged airplanes had of getting their pilots back to the carrier deck" (p. vii). The company remained dependent upon the Department of Defense (DOD) as its predominant (if not sole) customer throughout the vast majority of its corporate life. When Grumman did venture into the realm of product diversification in the civilian market (e.g., windmills, buses, and solar panels [p. 163]), these excursions proved unprofitable. Do these business decisions illustrate bad management practices? Readers must decide for themselves.

One of the authors, George M. Skurla, relates Grumman's story through a series of anecdotal vignettes based on events that occurred during his tenure at the *Iron Works*. Though the tale of one specific company, it has a more far-reaching effect insofar as the book offers readers an appreciation of the inner workings of the defense industry's aircraft-building element over a 30-year period. It identifies successes in innovation by several firms as they evolve into major defense contractors, a phenomenon that becomes readily apparent to Skurla as he visits Lockheed, where he sees firsthand the F-117, and then Northrop, where he views a model of the B-2. Because these first ventures into the realm of stealth technology represent something unknown to Grumman, he criticizes its management style for a lack of awareness. Perhaps it was mismanagement at Grumman, or perhaps it was a conscious decision by the government to limit the cognizance of stealth technology during its infancy—that is a question of public policy and something for the reader to determine.

However, the firsthand accounts of how business works and how Congress, the DOD, and defense contractors depend upon each other to fulfill their own missions and assure our collective security undeniably justify the price of the book. A fast read, *Inside the Iron Works* offers detailed insight into the defense industry as seen through the eyes of one of the company presidents and chief operating officers.

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B-17 at War by Bill Yenne. Zenith Press (http://www.zenithpress.com), 729 Prospect Avenue, P.O. Box 1, Osceola, Wisconsin 54020, 2006, 128 pages, $19.95 (softcover).

When people think about American airpower in World War II, several images stand out. There are perhaps no other icons more compelling than the elegant silhouette of the magnificent Boeing B-17 Flying Fortress. Whether painted in camouflaged olive drab or glistening in its unpainted natural silver finish, this aircraft, bristling with .50-caliber machine guns, struck fear and demanded respect from its German adversaries in the Luftwaffe. Against this backdrop, Bill Yenne adds to the already overcrowded history of this amazing airplane.

A San Francisco–based author, Yenne has written more than two dozen books on the military, aviation, and other historical topics, including the excellent *Story of the Boeing Company* (Zenith Press, 2005). Because of his knowledge of the history of one of America's most significant companies, it comes as no surprise that the author decided to narrow his focus to one of Boeing's most important aircraft. What is surprising, however, is the lack of detail in this rather expensive paperback.

Like other authors of the publisher's At War series, Yenne probably had to encapsulate as much history of the B-17 as possible within a limited number of pages. Considering the plethora of B-17 books available, many of them hundreds of pages in length, trying to put the entire history of such a magnificent machine into fewer than 130 pages is no small feat. Unsurprisingly, the author falls a little short in this attempt.

Although *B-17 at War* contains more than 100 excellent photographs, 32 of them in color, it includes no cutaway drawings, color plates, profile comparisons between B-17 variants, or maps of the operating areas in Europe, the Pacific, or the Mediterranean. Although the development of combat-box formations, which helped thwart attacks by Luftwaffe fighters, contributed to the B-17's success, one finds no detailed mention or illustrations of them. The book does, however, discuss the little-known but nevertheless interesting operational history of the B-17 in the Pacific. Although *B-17 at War* details an inventory of the aircraft for selected months as well as the number of variants and their specifications, it never fully gets off the ground as a significant work of history. For example, Yenne talks about the YB-40 (B-17 gunship) but omits any pictures of this aircraft. Simply put, *B-17 at War* provides a look at B-17 operations on an almost day-by-day basis, illustrated throughout with photographs, but offers very little new information, no detailed analysis of bomber operations, and too few stories of the men who flew this great airplane in combat.

Despite its simple, clean presentation, I find it difficult to recommend this book since it presents little or nothing in terms of historical significance; in reality, it is a rehash of the dozens of other B-17 books already on the market. If readers want another B-17 book with several new photographs and many of the same ones from other books, then they may want to add it to their collection. If, however, they prefer a fresh look at the B-17, along with new stories of bravery and courage under fire, then *B-17 at War* is not for them.

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Responsibility of Command: How UN and NATO Commanders Influenced Airpower over Bosnia by Col Mark A. Bucknam. Air University Press (http://www.maxwell.af.mil/au/aul/aupress), 131 West Shumacher Avenue, Maxwell AFB, Alabama 36112-6615, 2003, 428 pages, $40.00 (softcover). Available free from http://www.maxwell.af.mil/au/aul/aupress/Books/Bucknam/Bucknam.pdf.

In 1991 American airpower was reborn over the desert sands between Kuwait City and Baghdad. In the decade that followed, policy makers aggressively made use of airpower and its promise of seemingly unlimited precision and effectiveness. The forests and hills of the disintegrating former Yugoslavia represented airpower's next challenges—Bosnia during 1992–95 and Kosovo in 1999. Whether one calls these efforts successes or failures, they highlight the political challenges of employing and controlling violence from the air in situations less amenable to airpower than the first Gulf War. Colonel Bucknam addresses the first of these interventions—the air war over Bosnia, which began as Operation Deny Flight and ended as Operation Deliberate Force.

Through interviews and a study of North Atlantic Treaty Organization (NATO) and United Nations documents, Bucknam shows how upper-level commanders—of all nationalities—sought to control airpower to meet their particular goals. He details these interventions as they flowed both through and around the chain of command as circumstances dictated. Unsurprisingly, he concludes that commanders used their military expertise to gain influence over airpower from policy makers. What

is surprising is that he shows how commanders not only influenced the details of military intervention but also began to function as policy makers themselves. Colonel Bucknam demonstrates how this practice especially held true of NATO commanders, whose airpower plans (complemented by those at US Air Forces in Europe) often drove the selection of possible policy options. This conclusion is one of many worthy insights offered by *Responsibility of Command*, which should be read by anyone who wants to know more about how airpower functions in both peacekeeping and coalition warfare.

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Prisoners: A Novel of World War II by Burt Zollo. Academy Chicago Publishers (http://www.academychicago.com), 11030 South Langley Avenue, Chicago, Illinois 60628, 2003, 275 pages, $22.50 (hardcover).

In the months following the Normandy invasion in June 1944, the German army began its long retreat east. As it did so, an increasing number of German prisoners of war (POW) fell into Allied hands. Because resources were earmarked for Allied forces prosecuting the war—to end it as quickly as possible and thus save lives—the care of tens of thousands of German POWs became a low priority. Undoubtedly, the fact that many of them suffered and died in captivity gave rise to James Bacque's stunning accusation, appearing in his inflammatory book *Other Losses* in 1989, that Supreme Allied Commander Dwight Eisenhower *deliberately* tried to starve to death and otherwise murder German POWs. Reputable military historians quickly examined Bacque's assertions and concluded, convincingly, that no such policy and no such massacre ever existed. Now comes Burt Zollo, a former US Army soldier who served at one of those POW camps near the end of the war, to write a fictionalized account of such a camp. By doing so, he gives credence to the ridiculous charges of an Allied policy of deliberate starvation.

Zollo's story line is lackluster: "Sandy" Delman, a young American soldier and Jew working at one of the POW camps, is so outraged by the treatment of the Germans that he decides to take action, going straight to Lieutenant Colonel Nelson, camp commander, to propose a plan. Delman suggests taking a convoy of trucks—driven by German POWs—to supply depots near the front and requisitioning food and supplies directly. Nelson's requests for food, clothing, and medicine have gone ignored by higher-ups who, apparently, are content to let the prisoners die of neglect. Indeed, Zollo has one high-ranking officer exclaim, "I don't have to feed and clothe [expletive deleted] Nazis" (p. 160). Nelson agrees to Delman's scheme, but one of the POW drivers—an SS officer masquerading as an enlisted man—engineers an escape and takes a hostage (coincidentally, Delman's best friend). Delman tracks down the escapee alone, settles the score with the SS officer, rescues his buddy, and gets a convoy load of supplies back to the camp. Of course he receives no credit for his actions. It seems the Army is like that.

Prisoners is barely worth a review and certainly not worth reading, but I thought it necessary to call attention to the underlying fallacious premise regarding the American "policy" of murdering prisoners. That was simply not the case.

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Realizing the Dream of Flight: Biographical Essays in Honor of the Centennial of Flight, 1903–2003 edited by Virginia P. Dawson and Mark D. Bowles. NASA History Division (http://www.hq.nasa.gov/office/pao/History/history.html), 300 E Street SW, Washington, DC 20546, 2005, 326 pages, $20.00 (hardcover). To order, write the NASA Center for Aerospace Information, 7121 Standard Drive, Hanover, Maryland 21076. Available free from http://history.nasa.gov/sp4112.pdf.

Realizing the Dream of Flight, an anthology edited by Virginia Dawson and Mark Bowles, consists of academic papers presented at a conference celebrating 100 years of flight; it also includes a DVD recording of the conference proceedings. Expertly edited, finely produced, and containing a useful index, this book, like most anthologies, does not rely upon a common theme beyond aviation and space, and the papers vary in quality. The contributors, many of whom deal with their own particular research interests, are highly qualified historians and good writers, but only Alan Gropman has any practical experience with combat aviation.

His essay deals with Gen Benjamin O. Davis Jr., a principal player in the painful integration of blacks into the armed forces of the United States and one of the foundations of Gropman's seminal book, *The Air Force Integrates, 1945–1964* (1978). The other es-

say under the category "Military Strategists" (see the book's introduction, p. xi) is Tami Davis Biddle's piece about Gen Curtis E. LeMay, a central player in her important book *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas about Strategic Bombing, 1914–1945* (2002). Neither Davis nor LeMay was present at the creation of aviation, which had matured a fair amount by the time they got their wings. If the conference needed to include military operators in the story, then one wonders about the total absence of naval aviators.

In the first two essays, feminist scholars Amy Sue Bix and Susan Ware write about Bessie Coleman and Amelia Earhart, respectively. Closer to the creation of aviation, Coleman did not attain the fame that accompanied Earhart, and both women died in aircraft accidents at a young age, cutting short any further contributions they might have made. Ware does make the valid point that women seemed to play a greater role in the barnstorming age than they did after aviation became more profitable, laying that fact at the feet of gender discrimination. But Betty Friedan's great book *The Feminine Mystique* (1963) makes the point that the first wave of feminism died out after passage of the 19th Amendment and did not revive until the second wave got rolling in the 1960s. I think she explained that, as a cultural phenomenon, it included the ideas of many women as well as male prejudices. In any event, both aviatrixes had an important moral and financial supporter—a male in both cases.

The anthology also includes three fine essays by William M. Leary, W. David Lewis, and Roger Bilstein on the emergence of aviation as a profitable enterprise during the 1930s. Leary addresses the collaboration of Charles Lindbergh and Juan Trippe in the building of Pan American Airways; Lewis writes about the part played by Eddie Rickenbacker, Johnny Miller, and Eastern Airlines in airmail service; and Bilstein offers an account of Donald Douglas's rise and fall. Later on, Tom D. Crouch, Michael Gorn, Andrew J. Dunar, and Roger Launius—all fine historians of air and space technology—contribute chapters about the genesis and maturing of the space age. Most of them deal with figures not well known to Air Force officers: Willy Ley, a space writer; Hugh Dryden, a scientist and manager; and Robert Gilruth, a mover and shaker in the manned spaceflight program who lived in the shadow of the astronauts. The other essay—about Wernher von Braun, who *was* present at the creation of the space age—is a stimulating piece.

The other chapters are probably sufficient for any Air Force officer's professional reading program, but he or she will want to go to Gropman's book on integration and Biddle's on strategic bombing for the detail necessary to the military profession. The essays on commercial aviation and NASA space development are summaries often drawn from other books but sufficient for the modern air warrior. Even though *Realizing the Dream of Flight* does not form a coherent whole, it might deserve a middling place on officers' reading lists if they already have a pretty firm grasp of the history of air and space power.

Dr. David R. Mets
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Pacific Skies: American Flyers in World War II by Jerome Klinkowitz. University Press of Mississippi (http://www.upress.state.ms.us), 3825 Ridgewood Road, Jackson, Mississippi 39211-6492, 2004, 256 pages, $32.00 (hardcover).

English professor Jerome Klinkowitz has written extensively about World War II in such books as *Their Finest Hours: Narratives of the R.A.F. and Luftwaffe in World War II* (1989), *Yanks over Europe: American Flyers in World War II* (1996), and *With the Tigers over China, 1941–1942* (1999). In *Pacific Skies*, he takes the familiar in a new direction, leaving the archives to historians and using as his material the narratives written by participants, both during the war and in the half century since. With room for only 100 of the thousands of memoirs and biographies available, Klinkowitz is necessarily selective in making his choices. His selection seems representative, including the classics as well as relatively obscure works. And he uses writings by both American and Japanese veterans.

The book has two parts. First, the author tracks the war chronologically, dividing it into four parts: peacetime and the sudden outbreak of war, the Japanese advantage, the turning of the tide, and the late-war shift in approach, including the kamikazes and low-altitude firebombing. This is not a battles-and-leaders narrative; the book presents not only the old, familiar accounts of Curtis LeMay, Jimmy Doolittle, and "Pappy" Boyington, but also (and more often) those of various aces, heroes, and ordinary Airmen. It relates a personal war rather than an official one. The first section consists of the introduction and all but one of the topical chapters ("Going to War in Peacetime," "An Air War at Sea and on Land," "Tales of the South Pacific," and "Endgame").

"Endgame" discusses the final phase of the war, characterized by kamikazes and the firebombing of Japan. The increasing brutality of war during this period provides a natural lead into the other part of the book, the thematic one. In this section, Klinkowitz examines the attitudes of the adversaries, the philosophical underpinnings and motivations, and the perception of the foe. He also draws distinctions between the nature of war in the Pacific and in Europe. Moreover, he deals with an odd phenomenon—the unusually large percentage of Pacific veterans who turned to religion of one sort or another in the aftermath of the war.

A polished and experienced writer, Klinkowitz has 40 books to his credit and knows how to tell a story. The work holds together nicely throughout. We encounter a bit of slippage late, when Klinkowitz discusses debates over the dropping of the atomic bombs in a one-sided manner. His attempt to make the kamikazes explicable is adequate but not satisfying. Also, he seems to have written the philosophical section without consideration of Paul Fussell's *Wartime: Understanding and Behavior in the Second World War*, written in 1989 but arguably still the best study of attitudes and motivation in the Pacific war. Regardless of these shortcomings, however, *Pacific Skies* is worth the few hours it takes to read it.

Dr. John H. Barnhill
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Soldiers and Ghosts: A History of Battle in Classical Antiquity by J. E. Lendon. Yale University Press (http://www.yale.edu/yup), P.O. Box 209040, New Haven, Connecticut 06520-9040, 2005, 480 pages, $35.00 (hardcover), $20.00 (softcover).

Once upon a time, there was an ad campaign promoting public libraries, the theme of which declared "You Are What You Read." This promotion emphasized the idea that increasing the amount of material read would mold anyone into a better educated and more productive person. Nothing could illustrate this concept more effectively than using ancient Greece and Rome as role models. J. E. Lendon's book *Soldiers and Ghosts*, a far cry from a fairy tale or an ad campaign, gives the reader a very thorough appreciation for why these two cultures' military forces became what they read. Across the pages of both Greek and Roman history, he decisively shows us that neither culture suffered from a shortage of reading and that both had ample opportunity to employ what they read.

Lendon starts with a review of the Greeks' military culture and mind-set—an important introduction because it sets the historical stage for the entire book. Noting that the ancient Greeks based many of their warrior principles upon *The Iliad*, written around 700 BC, he stresses that a number of historians refer to the Homeric poems as the bible of the Greeks (p. 36). Lendon further observes that the Greeks based their warrior principles not so much on the military discipline and order familiar to modern warriors but on the characteristics of a sports team. That is, war became a competition, with the contestants battling more for recognition as the bravest or most glorious (as in *The Iliad*) than because their general ordered them to fight.

This mind-set plays throughout Greek military history—from the Spartan philosophy and culture of conduct in warfare—and culminates with a discussion of Alexander the Great's campaign to the Middle East (itself Homeric in proportion and deed). It also plays into the use and evolution of Greek military formations from 500 BC into early 200–300 AD. Technology seldom drove changes in the Greek method; in fact, the Greeks had forsaken advances in military technology in favor of implementing interpretations of historical writings and discussions over "the right way" to conduct war and behave in it.

Through this review of history and analysis of Greek writings, Lendon shows the reader how the Greek military philosophy operated, why it operated the way it did, and the natural conclusions of this track. Choosing not to concern itself solely with the military side of affairs, *Soldiers and Ghosts* also explores the civilian and political connections of Greek society since the Greeks initially believed in a citizen-soldier as much as Americans do (but in a somewhat different context). Throughout this study, one finds the underpinning that Greek writings, rooted in ideals from and interpretations of *The Iliad*, constituted the foundation for the Greeks' military psyche and doctrine.

Lendon uses the second half of *Soldiers and Ghosts* to discuss Rome and its rise as a republic as well as its fall as an empire. The Romans also believed in a citizen-soldier concept but with a Roman twist. Like the Greeks, they based their military psyche and doctrine on their historical readings (some of which were probably fabrications loosely based on a historical event). As Romans' cultural awareness grew during the first two centuries AD, so did their interest in "ancient" Greece. Without belaboring the point, suffice it to say that the author does an equally admirable job in discussing the Roman war and civil psyche as well as their ap-

plication to military campaigns as Rome's high-water mark rose and then fell.

Why is a book as obscure as *Soldiers and Ghosts* important to advocates of airpower and space power today? We all recall Sun Tzu's mantra "know your enemy as yourself." To better anticipate the enemy, it's important not only to find out *what* he would do but why he would do "that something" *that way*. Such is the rationale that Lendon presents—to great effect! The Greeks and Romans behaved as they did for the most part because of the readings they incorporated into their military and civilian cultures. Our military employs its doctrine as it does, based upon lessons learned and continued professional readings; likewise, people in our society view military ideals as they do, based upon what they read and see. It's not far fetched to say that other militaries and societies, past and present, function similarly.

My only complaint about *Soldiers and Ghosts* involves the constant sidebar diversions within chapters that the author uses to build further points. Imagine sitting in a math lecture only to have a social-sciences topic emerge on the professor's board for a 10-minute discussion. Eventually, all of these points that Lendon brings up come back to roost at the end of the chapter. Some help to clarify main points or even bring up new points upon which other chapters elaborate. Still, the sudden jumps from one topic to a completely different topic on the same page were distracting—I frequently wondered where the tangents were leading.

Nevertheless, Lendon's study makes for very enjoyable reading about ancient Greece and Rome. More importantly, it gives the reader tools to ponder other militaries and their societies—a skill that could no doubt prove beneficial to future analysts and planners in the ongoing global war on terror. *Soldiers and Ghosts* gets my vote as a must-read.

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The Intelligence Archipelago: The Community's Struggle to Reform in the Globalized Era by Melanie M. H. Gutjahr. Joint Military Intelligence College (http://www.dia.mil/college/index.htm), 200 MacDill Boulevard, Washington, DC 20340-5100, 2005, 283 pages.

The Intelligence Archipelago examines efforts to reform the intelligence community dating back to World War II. Written by Melanie Gutjahr (an intelligence professional with more than 25 years' experience) during a one-year stay at the Joint Military Intelligence College's Center for Strategic Intelligence Research, the book demonstrates that intelligence reform is difficult and sometimes impossible, thanks to turf battles, congressional wrangling, lack of resources, and personality conflicts. Most importantly, the study documents the struggle to change the course of the intelligence community after the collapse of the Soviet Union and the emergence of a new, globalized world.

Gutjahr refers to the National Security Agency and its struggle to intercept and monitor new communications media, such as the Internet, that the agency had not dealt with during the Cold War. As components within the intelligence community struggled with new tasks, a series of intelligence failures seemed to accompany the rise of new radical-Islamic terrorist groups. India's nuclear tests, North Korea's missile launch, and the proliferation of nuclear materials added to the community's woes. Congress's attempts to change the community after the collapse of the Soviet Union and the emergence of a new global order in the nineties illustrate the difficulty of some of these executive- and legislative-branch struggles. From a historian's point of view, the author provides a useful service to anyone attempting to gather information about what transpired in the House and Senate Intelligence Committees during those turbulent years.

According to Gutjahr, the definition of "intelligence reform" and what it should encompass involves most reform movements, regardless of whether the executive or legislative branch pushes the changes. Others have argued that in the post–Cold War global age, intelligence is adaptive and that the community must continuously reform itself. Reform should occur as a community-wide, perpetual series of process-improvement tasks. Processes and procedures that guarantee success against today's opponents will not work on tomorrow's enemy, who has shown his adaptability and maneuverability inside our decision cycles—hence the need for intelligence reform. Believing that the intelligence community remains caught up in a 1947 structure, the author argues for far-reaching changes, which Congress in 2004 could not muster the votes to pass.

The Intelligence Archipelago covers every issue within the intelligence community for the last 15 years—including transnational issues that emerged with the proliferation of technologies, the creation of the National Imagery and Mapping Agency (now the National Geospatial-Intelligence Agency), and the emergence of terrorists with state support. In-

telligence officers will recognize all problems and situations described in the book, lending it the credibility that so many other reform texts lack.

Gutjahr also addresses the terrorist attacks of 11 September 2001 and subsequent attempts at reform, using data from the National Commission on Terrorist Attacks upon the United States (the 9/11 Commission) to illustrate the systematic nature of intelligence failures. She then examines the commission's report in detail and turns her attention to the struggles that accompanied the creation of the position of director of national intelligence. Her detailed exposé helps the reader understand the complex posturing within the intelligence community as Congress inevitably mandated reform. Such reform is hampered by a lack of a shared vision between the intelligence community on one side and Congress and the president on the other. Some of Gutjahr's anecdotes suggest that improvement has occurred, but others demonstrate that the bureaucratic processes deeply embedded within the community have not changed.

Granted, the text suffers from problems that typically arise when authors attempt to turn an academic thesis into a book—that is, too many quotations, poor layout, and wordiness that makes it difficult for the reader to follow the author's key points. Nevertheless, these flaws should in no way stop the intelligence professional, historian, or political scientist from studying the data therein. *The Intelligence Archipelago* is a gold mine of information, and the annexes—a collection of executive orders and legislative bills—show the path of reform to the current intelligence community. I highly recommend it to officers, intelligence professionals, and anyone interested in government reform.

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Why Air Forces Fail: The Anatomy of Defeat edited by Robin Higham and Stephen J. Harris. University Press of Kentucky (http://www.kentuckypress.com), 663 South Limestone Street, Lexington, Kentucky 40508-4008, 2006, 416 pages, $39.95 (hardcover).

Historians have well documented the defeats of armies and navies but have paid far less attention to the defeat of air forces. What does exist is usually in histories of the greater conflict of which the air campaigns were a part. In *Why Air Forces Fail*, perhaps the first study of its kind, 11 well-known historians of aerial warfare take on this noteworthy task with short but detailed and engaging essays. The contributors consider the defeats of the air forces of Poland (1939), France (1940), Arab countries (1967), Germany and Austria-Hungary (1914–18), Italy (1939–43), Imperial Japan (1942–45), Germany (1940–45), Argentina (Falklands War, 1982), Russia (1941), United States (1941–42), and Britain (1941–42). Through these essays, the book explains the complex, often deep-seated foundations for these catastrophes.

The book's editors are well versed in military history. Robin Higham, professor emeritus of military history at Kansas State University and editor of the journal *Aerospace Historian* from 1970 to 1988, has written and edited many books on varied aspects of military history. Currently chief historian at the Directorate of History and Heritage, National Defence Headquarters, Canada, Stephen Harris coauthored the official history of the Canadian air force. The two editors asked prospective contributors to examine "archetypical examples from which worthwhile conclusions could be drawn" (p. 1) and provided them with numerous questions to stimulate their thinking. They especially wanted the contributors to go beyond technical, tactical, and political reasons for the defeats of the subject air forces.

Thus, the essays are both overviews and analytical narratives that examine more than the specific air campaign. In addition to the typical reasons for these catastrophic defeats, the contributors provide doctrinal, logistical, and cultural reasons to show why these air forces failed in their respective historical air campaigns. Each also discusses the industrial and economic capability of each country to produce/obtain the quantity and quality of aircraft (airframes and aircraft engines) needed to counter prospective enemies effectively. Most also discuss an important but often overlooked aspect—the quality of aircrews and maintenance personnel.

Guided by the editors' initial request, each contributor came up with the same basic reasons for the defeat for these air forces despite differences in time, place, economic status, and culture. They concluded that the leaders of each country and its air force did not properly connect doctrine, technology, and industrial output to produce aircraft and trained crews and maintenance personnel to preclude defeat in the historical campaign. Their failure did not generally stem from ignorance or stupidity but from the politics and culture of their times. For example, the defeated air forces of 1939–42 were the products of post–World War I mentality and economics as much as technology developments. The initial air victors of that con-

flict—Germany and Japan—had simply done better than their defeated enemies. However, in the long run, neither air force could maintain its position because of the same basic causes that hampered the air forces they had initially defeated.

The editors could have organized the book better. The essays are arranged haphazardly—not topically or even chronologically. Higham and Harris themselves write that the defeated air forces fall into three categories: (1) the "dead ducks," which never had a chance (German air force of World War I, Russian in 1941, Polish in 1939, French, and Italian); (2) the "hares," which had initial success but eventually failed (Luftwaffe and Japanese air force in World War II); and (3) the "phoenixes," which suffered initial defeats but were reborn from the ashes of their defeats (the Argentine air force, Arab air forces, Royal Air Force in 1941–42, and US Army Air Forces in the Pacific, 1941–42). If the editors had arranged the essays by these categories, readers could have better discerned similarities and differences among the different air forces.

As one would expect, the essays differ in quality and depth. The better ones cover a relatively short campaign, such as those of the Polish and French air forces at the beginning of World War II. On the other end of the spectrum, one finds the essay on the Arab air forces, which tries to do too much by discussing all of the major Middle Eastern air forces, including the Israeli air force, from the 1950s to the 1970s. A better approach would have focused more on the Egyptian and Israeli air forces alone. Each essay also includes short bibliographies and areas for future research—definite pluses. Overall, *Why Air Forces Fail* represents a much-needed and long-overdue addition to airpower history and a must-read for any airpower enthusiast, historian, and serving operational Air Force officer.

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Weapons of Choice: The Development of Precision Guided Munitions by Paul G. Gillespie. University of Alabama Press (http://uapress.ua.edu), Box 870380, 20 Research Drive, Tuscaloosa, Alabama 35487-0380, 2006, 232 pages, $35.00 (hardcover).

During the brief history of aviation, our nation's bombing efforts have progressed from using hundreds of bombers to destroy a single enemy target to sending a single aircraft to hit multiple targets precisely. Key to this revolutionary capability are precision-guided munitions (PGM), ranging from early radio-controlled bombs to the current generation of laser- and satellite-guided weapons, whose development we can attribute to both human innovation as well as evolutions in technology. These weapons, which permit more flexibility in aircraft delivery and enhance bombing accuracy, have become a key asset of our military. Moreover, their ability to destroy targets yet cause little to no collateral damage has changed national-security policy.

Weapons of Choice provides a detailed account of the US military's development of PGMs, an effort that began during World War I and continues today in the form of numerous programs. Gillespie traces these weapons throughout aviation history, addressing their testing and employment as well as military and political players' reaction to them. He not only discusses the effect of PGMs on military strategy and tactics for all major US conflicts from World War I to recent battles in the Gulf, but also analyzes how they have affected current airpower capabilities. The author limits his coverage to conventional guided bombs (not cruise missiles or surface-to-surface missiles), examining the innovation, technology, budgets, national-security policy, and politics that have shaped their development; he also uses the results of multiple Quadrennial Defense Reviews to assess the effect of PGMs on current national policy and force structure. His book exposes readers to the wide variety of guided weapons and explores reliability and logistical issues that raised concerns about employing them in battle.

Unfortunately, Gillespie does not delve into the recent emergence of the small-diameter bomb or mention capabilities that the military might like to see in future PGMs. Such omissions, however, do not detract from the book's ability to educate readers on the current capabilities/limitations of these weapons and their effect on airpower. Lastly, Gillespie seems somewhat biased toward the Air Force despite the other services' major contributions to the development of precision weapons.

Overall, *Weapons of Choice* offers an excellent history of PGMs. Airpower enthusiasts and novices alike will gain a better understanding not only of the important capabilities that the current generation of PGMs gives the military, but also of the adverse effect their absence had on earlier conflicts in our nation's history.

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Mission Debrief

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The Editor

OUR CONTRIBUTORS

Lt Gen Stephen R. Lorenz (USAFA; MPA, University of Northern Colorado) is the commander of Air University, Maxwell AFB, Alabama. The general attended undergraduate pilot training at Craig AFB, Alabama. A command pilot with 3,300 hours in eight aircraft, he has commanded an air-refueling squadron, a geographically separated operations group, an air-refueling wing that won the 1994 Riverside Trophy for Best Wing in Fifteenth Air Force, and an air-mobility wing that won the 1995 Armstrong Trophy for Best Wing in Twenty-first Air Force. He also served as the commandant of cadets at the US Air Force Academy and as deputy assistant secretary for budget, Office of the Assistant Secretary of the Air Force for Financial Management and Comptroller, Headquarters US Air Force, Washington, DC. General Lorenz is a graduate of Squadron Officer School, Air Command and Staff College, Air War College, and the National War College.

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Maj Gen Allen G. Peck (USAFA; MS, Air Force Institute of Technology; MA, Salve Regina College) is commander, Headquarters Air Force Doctrine Center, and vice-commander, Air University, Maxwell AFB, Alabama. He has served as an F-15 aircraft commander, instructor pilot, and standardization and evaluation flight examiner. General Peck has completed two tours on the Air Staff at the Pentagon and a joint assignment as chief, Current Operations, US Central Command (USCENTCOM), MacDill AFB, Florida. The general has commanded an air operations group in Germany, an air expeditionary wing in Saudi Arabia, and the Air and Space Expeditionary Force Center, Langley AFB, Virginia. A key planner for the air war over Serbia, General Peck served as chief, Combat Plans, combined air operations center (CAOC), Vincenza, Italy, during the subsequent campaign. He also served with the commander, Air Force forces at USCENTCOM's CAOC during Operation Iraqi Freedom's major combat operations. As deputy combined force air component commander, he oversaw planning, tasking, execution, and assessment of coalition air operations for Operations Iraqi Freedom and Enduring Freedom. A command pilot with more than 2,700 hours in the F-15, including more than 300 combat hours, General Peck is a distinguished graduate of the US Air Force Academy, Squadron Officer School, the Air Force Institute of Technology, and the College of Naval Command and Staff; he also attended Harvard University as a National Security Fellow.

C. R. Anderegg (BA, Hobart College; MS, Troy University), a member of the Senior Executive Service, is the director, Air Force History and Museums Policies and Programs, Headquarters US Air Force, Washington, DC. Prior to assuming his current position, Mr. Anderegg was an air and space power strategist in Project Checkmate during the planning and execution of Operations Enduring Freedom and Iraqi Freedom. He served as an active duty Air Force officer for 30 years, commanding an F-15 squadron and twice serving as a fighter group commander and twice as a fighter wing vice-commander. A former F-4 Fighter Weapons School instructor pilot, he flew more than 3,700 hours in the F-4C/D/E/G and the F-15A/C/E, including 170 combat missions during the Vietnam War. Following his retirement from the Air Force at the rank of colonel, he wrote *The Ash Warriors* and *Sierra Hotel: Flying Air Force Fighters in the Decade after Vietnam.* Mr. Anderegg is a graduate of Squadron Officer School, Air Command and Staff College, and Air War College.

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Maj Matthew F. Durkin (USAFA; MS, Air Force Institute of Technology) is a resource analyst at Headquarters USAF/A9 (Air Force Studies, Analysis, Assessment, and Lessons Learned). He previously served as test director for the A-10 Aircraft Sustainment Squadron and as an A-10 aircraft-battle-damage-repair engineer at Hill AFB, Utah. He led planning of a multimillion-dollar test program to ensure successful integration of state-of-the-art targeting-pod and precision-weapon capabilities on the A-10. Major Durkin is a graduate of Squadron Officer School.

Lt Col Marty Reynolds (USAFA; BS, Pennsylvania State University; MBA, Gonzaga University; MA, George Washington University; MOA [Master of Operations Analysis], Air Force Institute of Technology) is the director, Commander's Action Group and Analysis, Assessment, and Lessons Learned (A9), Twelfth Air Force (Air Forces Southern), Davis-Monthan AFB, Arizona. He previously served as chief of staff, 355th Wing, and assistant director of operations, 41st Electronic Combat Squadron, Davis-Monthan AFB, and as staff weather officer, tanker airlift control center, Scott AFB, Illinois. An EC-130 instructor pilot, he flew combat missions in Operations Enduring Freedom and Iraqi Freedom. Colonel Reynolds is a graduate of Squadron Officer School and the Air Force Institute of Technology (intermediate developmental education).

Maj Timothy P. Franz (BS, University of Central Florida; MS, Central Michigan University; MS, Air Force Institute of Technology) is assigned to Barksdale AFB, Louisiana, to work on the stand-up of the new Cyber Command. In this role, he provides direct support to all Air Force network-attack squadrons. He previously served as an information-operations planner at Headquarters United States Strategic Command, Offutt AFB, Nebraska. Major Franz also helped stand up the 23d Information Operations Squadron, where he co-led the creation of Black Demon, the Air Force's first global network-defense exercise, and spearheaded the publication of Air Force Tactics, Techniques, and Procedures (AFTTP) 3-1, vol. 36, *Information Warfare*, 2001, the Air Force's first information-operations tactics manual. Major Franz is a distinguished graduate of the Air Force Institute of Technology, Squadron Officer School, and Undergraduate Space and Missile Training.

Maj Aaron D. Troxell (USAFA; MS, Wright State University; MOA [Master of Operations Analysis], Air Force Institute of Technology) is chief, Unit Compliance Inspections Branch for the inspector general, Headquarters Air Force Materiel Command, Wright-Patterson AFB, Ohio. He has program-management experience in the B-1B and KC-135 program offices. The major also has held various group and squadron flying assignments, including commander, Current Operations Flight, 22d Operations Squadron, McConnell AFB, Kansas. He has deployed in support of Operations Southern Watch, Allied Force, and Enduring Freedom. Additionally, he served as an operations officer for Operation Iraqi Freedom, directing 20 KC-135s and 32 crews as well as the execution of 1,300 wartime sorties. A graduate of Squadron Officer School and Air Command and Staff College, Major Troxell is a senior pilot who has logged over 2,500 hours in tanker aircraft with experience in combat and special-operations support.

Lt Col Robert F. Mills, USAF, retired (BS, Montana State University; MS, Air Force Institute of Technology; PhD, University of Kansas), is an assistant professor of electrical engineering at the Air Force Institute of Technology (AFIT), Wright-Patterson AFB, Ohio. He joined the AFIT faculty after serving 21 years as a communications officer in a variety of information-systems-management and engineering roles. His research interests include information operations and security, electronic warfare, network management, and systems engineering. Lieutenant Colonel Mills is a graduate of the US Army Command and General Staff College and Joint Forces Staff College.

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Maj Richard A. Raines, USAF, retired (BS, Florida State University; MS, Air Force Institute of Technology; PhD, Virginia Polytechnic Institute and State University), is director, Center for Information Security Education and Research, Department of Defense Transformation Chair, and associate professor of electrical engineering, Graduate School of Engineering and Management, Air Force Institute of Technology, Wright-Patterson AFB, Ohio. A senior member of the Institute of Electronics and Electrical Engineers, he has authored or coauthored more than 90 technical publications in the areas of computer and satellite communications, communications theory, vulnerabilities of communications systems, and information security. Major Raines is a graduate of Squadron Officer School and Air Command and Staff College.

Maj Samuel D. Bass (BS, University of Central Florida; MS, Embry-Riddle Aeronautical University; MS, Air Force Institute of Technology) is senior communications watch officer, Operations Team 3, National Military Command Center, Pentagon, Washington, DC. He has been a student at the Air Force Institute of Technology (AFIT), Wright-Patterson AFB, Ohio, and has served as combat-communications flight commander and contingency planner at Ramstein Air Base, Germany; Air Mobility Command network-operations and security-center flight commander and group executive officer at Scott AFB, Illinois; commandant of cadets and assistant professor of air and space studies at AFROTC Detachment 20, Tucson, Arizona; and missile combat-crew member, crew evaluator, and crew instructor at Malmstrom AFB, Montana. Major Bass is a graduate of intermediate developmental education (AFIT) and Squadron Officer School.

Col Mark C. "Marshal" Dillon (BS, Arizona State University; MA, Embry-Riddle Aeronautical University; MSS [Master of Strategic Studies], Air War College) serves as the US Transportation Command liaison to US Southern Command, Miami, Florida. His other staff assignment was at Headquarters US Air Force, Pentagon. Colonel Dillon began his career as a space shuttle systems engineer. A distinguished graduate of undergraduate pilot training, he has commanded the 22d Airlift Squadron at Travis AFB, California, the 782d Expeditionary Airlift Squadron (the first C-5 combat deployment into Afghanistan during Operation Enduring Freedom), and the 97th Operations Group at Altus AFB, Oklahoma. Prior to his current assignment, he served as vice-commander, 97th Air Mobility Wing, Altus AFB. A distinguished graduate of Air Command and Staff College and a command pilot with more than 3,500 flying hours in the C-5, KC-10, T-38, C-17, and KC-135, Colonel Dillon has combat experience in both the C-5 and KC-10.

Maj Aaron A. Tucker (BS and MS, University of Southern California; MS University of Missouri–Rolla) is the C-17 flight commander and a C-5 and C-17 experimental test pilot in the 418th Flight Test Squadron, Edwards AFB, California. He has commanded combat missions into Afghanistan and Iraq as a C-5 flight-examiner aircraft commander at Travis AFB, California. As an Air Force intern at the Pentagon, Major Tucker worked in the Military Personnel Policy Directorate of the Office of the Secretary of Defense, Rated Force Policy Branch in the Air Staff, and Congressional Action Division in the Air Force Secretariat. He graduated from the US Air Force Test Pilot School at Edwards AFB and was honored by his classmates with the Aaron C. (C-dot) George Award for best warrior focus to field the best weapon system possible. Major Tucker is a distinguished graduate of Squadron Officer School.

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Left to right: Lt Gen Stephen R. Lorenz, commander, Air University; Gen Stéphane Abrial, chief of staff, Armée de l air (French air force); Mr. Rémy Mauduit, editor, Air and Space Power Journal-Français; and Gen T. Michael Moseley, chief of staff, US Air Force, during General Abrial s visit to Air University, Max well AFB, Alabama (5 April 2007).