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TO FLY AND FIGHT IN AIR, SPACE, AND CYBERSPACE

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Senior Leader Perspectives

Developmental Planning: The Key to Future War-Fighter Capabilities 5
Gen Bruce Carlson, USAF
Maj Stephen Chambal, PhD, USAF

Lorenz on Leadership: Part 2 9
Lt Gen Stephen R. Lorenz, USAF

Focus Area

Doctrine and Technology 20
Lt Col Paul D. Berg, USAF, Chief, Professional Journals

Features

Exposing the Information Domain Myth: A New Concept for Air Force and Information Operations Doctrine 49
Maj Geoffrey F. Weiss, USAF

Range and Persistence: The Keys to Global Strike 63
Col Phillip S. Meilinger, USAF, Retired

Weather and the Calculated Risk: Exploiting Forecast Uncertainty for Operational Risk Management 71
Maj F. Anthony Eckel, USAF
Capt Jeffrey G. Cunningham, USAF
Maj Dale E. Hetke, USAF

Integrating Weather in Net-Centric Warfare: A Case for Refocusing Human Resources in Air Force Weather 83
Col Scot T. Heckman, USAF

A Look down the Slippery Slope: Domestic Operations, Outsourcing, and the Erosion of Military Culture 93
Maj Bryan D. Watson, USAF

Departments

Prelaunch Notes

Ricochets and Replies and Presenting the Latest **Chronicles Online Journal** *Articles* 14

Ricochets and Replies 15

The Merge

We Are at War with Terrorists, Not Muslims 21
LTC Michael R. McGee, USA, Retired

Network-Centric Operations: A Need for Adaptation and Efficiency 24
CDR Phillip G. Pattee, USN, Retired

Whatever Happened to Strategic Attack? 31
Lt Col J. P. Hunerwadel, USAF, Retired

PIREPs

The Need for Developmental Planning 39
Mr. Gregory K. Jenkins
Lt Col Christopher A. Lettiere, USAFR

Excellence in Leadership: Lessons Learned from Top-Performing Units 44
Mr. Martin Pitt
Dr. Michael Bunamo

Review Essay

Fiction: A Higher Form of Truth? 105
Dr. David R. Mets

Quick Look

Effects-Based Information Battle in the Muslim World 109
Remy M. Mauduit

Book Reviews

One Day Too Long: Top Secret Site 85 and the Bombing of North Vietnam 111
Timothy N. Castle
Reviewer: Mr. Glenn Leinbach

Red Tail Captured, Red Tail Free: The Memoirs of a Tuskegee Airman and POW 111
Lt Col Alexander Jefferson, USAF, Retired
Reviewer: Lt Col Robert F. Tate, USAFR, Retired

Lockheed's SR-71 "Blackbird" Family: A-12, F-12, M-21, D-21, SR-71 112
James Goodall and Jay Miller
Reviewer: Col Joe McCue, USAF, Retired

Divining Victory: Airpower in the 2006 Israel-Hezbollah War 113
William M. Arkin
Reviewer: Lt Col John P. Hunerwadel, USAF, Retired

Where Are the WMDs? The Reality of Chem-Bio Threats on the Home Front and the Battlefield 114
Al Mauroni
Reviewer: LTC Richard S. Tracey, USA, Retired

I Want You! The Evolution of the All-Volunteer Force 116
Bernard D. Rostker
Reviewer: CSM Jim Clifford, USA, Retired

Twilight Warriors: Covert Air Operations against the USSR 117
Curtis Peebles
Reviewer: Capt Gilles Van Nederveen, USAF, Retired

With the Possum and the Eagle: The Memoir of a Navigator's War over Germany and Japan 118
Ralph H. Nutter
Reviewer: Dr. John H. Barnhill

American Defense Policy 118
Paul J. Bolt, Damon V. Coletta, and Collins G. Shackelford Jr., eds.
Reviewer: Lt Col Brian S. Brandner, ANG

Stand Well Clear: More Adventures in Military Aviation 120
D. K. Tooker
Reviewer: Lt Col John Wood, USAF

In Their Own Words: Conversations with the Astronauts and Men Who Led America's Journey into Space 120
Scott Sacknoff, ed.
Reviewer: Col Phil Bossert, USAF

Filling the Ranks: Transforming the U.S. Military Personnel System 121
Cindy Williams, ed.
Reviewer: Dr. David R. Mets

The Rising Tide: A Novel of the Second World War 123
Jeff Shaara
Reviewer: Capt Brian D. Laslie, USAF

Fiasco: The Amerian Military Adventure in Iraq 123
Thomas E. Ricks
Reviewer: Col Robert A. Potter, USAF, Retired

Mission Debrief 125

Air Force Mission Statement

The mission of the United States Air Force is to deliver sovereign options for the defense of the United States of America and its global interests—to fly and fight in Air, Space, and Cyberspace.

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Developmental Planning

The Key to Future War-Fighter Capabilities

Gen Bruce Carlson, USAF
Maj Stephen Chambal, PhD, USAF

While the [global war on terror] is the near-term priority, we firmly believe that the nation and the Air Force must prepare for emerging global threats at all levels of warfare. . . . In fact, we believe it's time to re-focus on and increase the asymmetric advantages the Air Force offers the nation. Our nation expects and deserves no less.

—Hon. Michael Wynne and Gen T. Michael Moseley

BOTH THE SECRETARY and chief of staff of the Air Force candidly addressed their strategic concerns to the Armed Services Committee of the US House of Representatives on 24 October 2007, highlighting the need to refocus on our asymmetric advantages in order to prepare for the global threats of future warfare. The Air Force must look across the spectrum of future capabilities and determine where those advantages could exist, given the proper emphasis on planning and fiscal considerations. Identifying such advantages and ensuring that we acquire our asymmetric capabilities on time depend upon a robust developmental planning (DP) function, a critical step that we currently lack. Early DP lays the foundation for identifying materiel solutions for acquiring weapon systems by investigating future threats; recognizing capability gaps and requirements; capturing needed system-performance characteristics; and understanding technology gaps, risks, and needs. Without this planning, the Air Force could find itself tactically focused, inadequately prepared to meet future threats, and postured to react only to forecasted or unanticipated advances of the enemy.

In today's air domain, we see evidence of our delinquency in DP. Protected by a highly integrated joint force, our nation depends on the Air Force to deliver air superiority today, tomorrow, and into the foreseeable future. Our service has maintained this asymmetric advantage for over half a century, due in large part to our past efforts in early planning and research. We began DP on the F-X aircraft, which became the F-15, a year before the first flight of the F-4D. We initiated DP on the Advanced Tactical Fighter, which became the F-22, three years before the first flight of the F-15. The first flight of the F-22 took place over six years ago; however, we have not begun any serious consideration of options for its replacement. We have not taken the first steps necessary to sustain our asymmetric and unparalleled advantage in the air.

The F-22 and F-35 represent the Air Force's newest generation of fighter aircraft. Although incredibly capable, these platforms do not—nor did we intend them to—guarantee air superiority indefinitely. In fact, we must begin exploring follow-on capabilities *today* if we wish to stay ahead of rapidly advancing threats across the globe. We cannot afford to forfeit our military advantage of air superiority to the enemy, thus giving him an equal footing, forcing the United States to fight on a level playing field, and relegating us to attrition-based

warfare. Given the proper national emphasis, we can avoid having to fight this way. We have no intention of relinquishing control of this war-fighting domain to an ever-growing and challenging threat that our nation will face in years to come.

The Air Force must initiate and support dedicated DP activities to deliver the next generation of capabilities that we will need to fly, fight, and win. Although similar shortfalls exist in other areas, this article focuses on the air domain to capture the interactions among domain trends, organic planning capability, and the current political environment, thereby highlighting the expanding gap in the development of future weapon systems. Our current national leadership has the responsibility for correcting this shortfall and addressing DP across the air, space, and cyberspace domains.

The early 1900s gave birth to aviation, but even as late as the 1930s, only a few Americans understood (and even fewer appreciated) the importance of airpower in military warfare. Only because of the courageous leadership of a handful of individuals, airpower came of age during World War II and single-handedly provided this nation with the sovereign options that led to victory in the Cold War. Even as we realized the importance of airpower's dominance, the aircraft-development cycle changed dramatically over the last 75 years, particularly within the military environment. Three key trends, specific to fighters and bombers, represent the overall direction of military aviation and indicate the growing pressures that aircraft procurement will face in the future. Figure 1 depicts the number of new-aircraft starts for fighters and bombers by decade.

In the past, rapid advances in aviation benefited greatly from a high number of new-program starts. At the same time, many industrial partners built their own aircraft to sell to the Department of Defense or to use in "fly-off" competitions. We gained an incredible amount of knowledge, experience, and technological maturity even when the programs were cancelled and not taken into full production. Soon after the end of World War II, new starts declined dramatically and have continued this downward trend, significantly affecting aviation dedicated to America's defense. Today, the rarity of new starts places tremendous pressure on early DP activities to support successful program execution. Figure 2 captures the troubling increase in the average number of years necessary to develop those fighter and bomber aircraft that will continue into full production.

As aircraft become more complex, the lead time necessary before starting a formal acquisition program also increases—a fact that emphasizes the importance of early exploratory

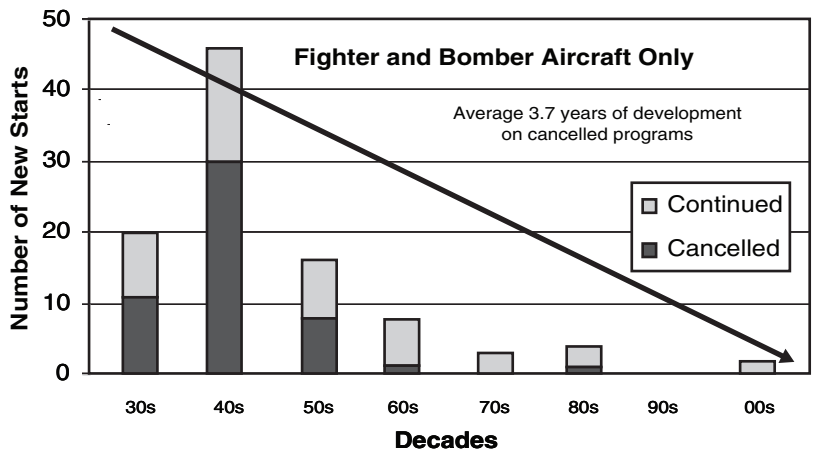

Figure 1. Number of new-aircraft starts per decade

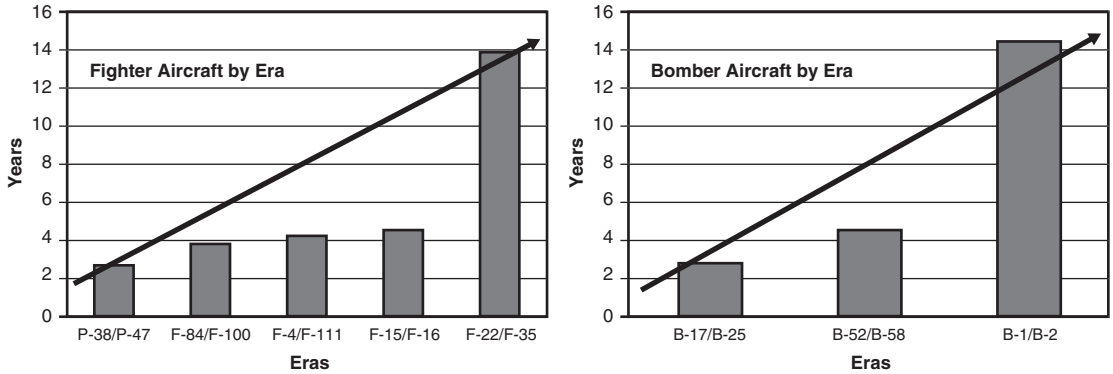

Figure 2. Average number of years in development (from technology-development request for proposal until delivery of the first production aircraft)

research. Although not addressed here, one finds that the same trend applies to mobility and air-refueling aircraft. Because of budget pressures, long lead-time requirements, and the urgency of developing and producing sophisticated aircraft at first fielding, we do not have the luxury of retiring aircraft and replacing them with newer platforms. Figure 3 illustrates this trend toward sustaining aircraft that must remain in service for longer periods of time.

These trends drive the need to consider additional design factors to provide for maintainability and long-term sustainment concerns—another reason to make provisions for DP. These issues will motivate our future practices in aircraft development and acquisition.

The overall trends for fighters and bombers are representative of defense aviation as a whole and portray a challenging future for aircraft production. Aircraft starts will be few and far between. We will develop platforms one at a time, with all our "acquisition eggs" in one basket. The time allotted to aircraft development will increase, and we will expect aircraft to last longer. Each program that we launch must succeed, a fact that underscores the need to conduct DP well in advance of predicted capability shortfalls.

DP is fundamental to the continued success of aircraft acquisition. The F-22 and F-35 both benefited from years of planning prior to an acknowledged program start. This early

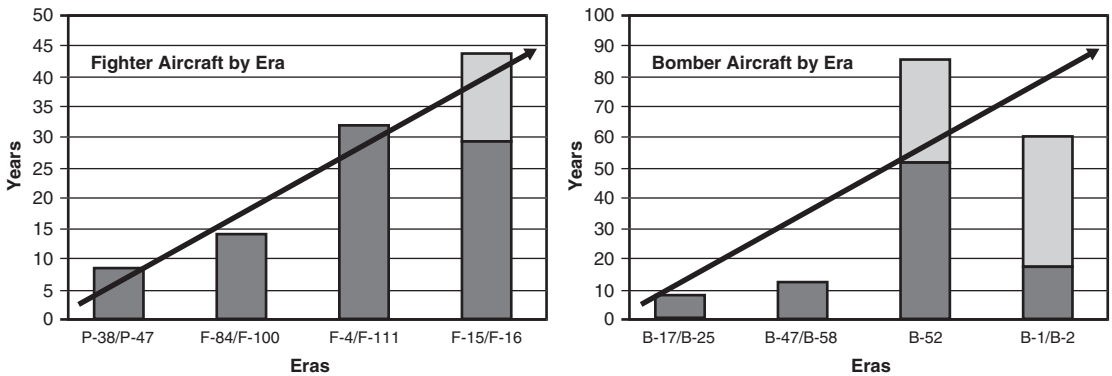

Figure 3. Average number of years flown (from first production until retirement; lighter-shaded areas based on projected retirement)

research enabled the Air Force to assess risk and refine technology, more fully understand the anticipated threat, and establish solid requirements for systems. The results of these activities proved invaluable as the programs progressed and were critical to attaining the performance we see today. Recently though, the Air Force has recognized a decreasing capability to conduct this type of early planning activity. Much like the trends in aircraft development, the trend in DP capability gives us cause for concern as the Air Force strives to maintain its advantage in air superiority.

The Air Force possessed a robust organic DP capability from the 1970s to the early 1990s. Acquisition organizations enjoyed a substantial number of personnel with unique DP skill sets and expertise. These personnel were responsible for supporting the definition of future capability needs, evaluating alternative concepts, assessing technology maturity and risk factors, defining sustainment and life-cycle cost issues, and forming executable acquisition strategies. Given today's realities, future aircraft-acquisition programs will not succeed without comprehensive DP as the critical first step in the acquisition cycle.

Our organic capability for DP began deteriorating in the 1990s and is now all but eliminated. Many factors contributed to this decline: reduced number of aircraft programs, decreased budgets, fewer trained personnel, higher-priority needs, and, most importantly, loss of dedicated funding to support DP activities. The net result is that our organic capabilities in this area have atrophied and face extinction. We simply cannot allow this to happen. DP is an essential function in translating capability and/or threat-based requirements into future combat capabilities for the Air Force and our nation. We must work to ensure that DP and the proper personnel remain in place, despite a very challenging fiscal environment.

Our nation, both inside and outside the military, finds itself overwhelmed with near-term priorities that consume most of our time, effort, and energy. We focus on the issues at hand: the global war on terror; the economy, with its associated constrained resources; and the upcoming political elections. Consequently, we devote little thought to establishing a long-term vision and conceptualizing the capabilities required to meet an increasingly dangerous world. Burdened with the immediate challenges at hand, we have confined ourselves to these thoughts, giving little attention to what comes next.

The economy will continue to evolve. The elections will come and go. The war on terror, whose successful resolution is pivotal to our way of life and the liberties we enjoy, will not be our last conflict. Therefore, those of us in uniform—those of us responsible for protecting this nation and preserving our safety, security, and freedom for generations to come—must focus at least a portion of our attention on the questions left unanswered: Who will be the enemy of the next war, and the one after that? What war-fighting capabilities do we need to give our nation the sovereign options to employ military force that no other country possesses? What should we do today to ensure that those capabilities remain in place tomorrow?

Doing nothing is not an option. We must begin to prepare today for challenges the future surely holds. It is our responsibility to devote the appropriate resources and effort to preparing for the unknown. We must invest in DP capabilities across all domains: air, space, and cyberspace. DP is the first step down every path to acquiring future war-fighting capabilities. The F-22, our newest air-superiority fighter, will not give us the final solution to air superiority. We must begin planning now in order to better understand and quantify the future threat environment, postulate capability shortfalls, and identify technological challenges of the future air domain. Today, we must begin to extend our capabilities beyond these aircraft, beyond our current understanding of air superiority, and into the complicated threat picture of future warfare. We are responsible for ensuring that future Airmen can fly, fight, and win in our next great conflict. The decisions we make today will affect our role in providing war-winning capabilities to America's integrated, joint warfare team as well as determine our nation's ability to protect our way of life and secure the freedoms that our children deserve. ❑

Lorenz on Leadership

Part 2

Lt Gen Stephen R. Lorenz, USAF

IN THE SUMMER of 2005, when I was director of Financial Management and Comptroller at the Pentagon, *Air and Space Power Journal* published an article of mine titled "Lorenz on Leadership." Now, as the commander of Air University, I sit down again to proffer some additional thoughts on my favorite subject: leadership. I hope that you share my enthusiasm for the study of leadership!

Never, Ever Give Up

In my last article, I quoted Winston Churchill and briefly explained why I find him so fascinating. One of his most famous quotations was, "Never, ever, ever give up!" Churchill was a man who met failure face to face many times in his life. He ran for Parliament and lost, only to be elected two years later. When he was the First Sea Lord of the Admiralty (equivalent to our secretary of the Navy), he planned the Gallipoli campaign in Turkey, which turned out to be an abject failure, and was fired. During the early 1930s, he railed against Nazi tyranny, but nobody listened to him. Then in 1940, he became the prime minister who led England in the war against Hitler. After the defeat of Germany but before the war against Japan ended, the people held an election, throwing him and his party out of office! Five years later, in 1950, he became prime minister for a second time. Wow! Talk about perseverance, tenacity, and strength of character! I admire Winston Churchill so much because the story of how he overcame his struggles in life is an example for all of us to follow.

As a graduate of the Air Force Academy—and I can truly say that those four years were tough—I could handle the physical, military, and mental aspects without much difficulty; however, my struggles were mostly academic.

You see, I was on the dean's "other" list six of eight semesters. I enjoyed courses in aeronautical engineering, computer science, and electrical engineering so much that I took them twice. Although this may seem humorous today, it is not an aspect of my history that I am particularly proud of; nevertheless, the lesson here is that one must never, ever give up. While many of my friends were going out to enjoy themselves on the weekends, I forced myself to concentrate on my studies, especially those math and science courses that held little interest for me—the ones I had to work on twice as hard just to pass. This particular aspect of character has served me well in the more than 34 years I have served in the Air Force, and now, as the commander of Air University, I am lucky enough to be responsible for most of the education in the entire United States Air Force. Isn't America a great country?

Life Is a Marathon, Not a 50-Yard Dash

We've all seen examples of athletes or teams who, in a moment of almost certain glory, celebrated too early, only to see victory swept from their grasp by an opponent who, not surprisingly, never, ever gave up. In our lives, it is important to remember that we must prepare to run a marathon—not a 50-yard dash. I'm sure that in your careers, you've seen military members start a task in a sprint only to find out it required marathon-like stamina. What's their first inclination? To give up because it was too hard. They didn't do their homework, so they spent all their energy in the early stages and couldn't complete the task. You see, life is about training and being prepared for opportunities when they come—you don't train for a marathon in the same way you train for a 50-yard dash! You must invest time and effort in understanding your goals and then in charting a course to accomplish them. I use the short-term, midterm, long-term approach, and I teach my people this as well. There's a lot of truth to the cliché "What's the best way to eat an elephant? One bite at a time." Understand the mission, do your homework, and never, ever give up!

Never Develop a Sense of Entitlement

You will never get what you want when you think you deserve it. Rewards always come later than we are typically willing to accept. Since we are human, we frequently compare ourselves to our peers, but we should really compete only with ourselves—not others. We see others being rewarded, so we take an "I should have won that" or "I deserved that" attitude. If you get the feeling that "you deserve" something or feel that the organization "owes you," immediately stop what you're doing, take a deep breath, and reevaluate yourself because once you go down that path of "me, me, me," it's hard to turn around. Over the course of my career in the Air Force, I've seen a number of people develop an entitlement attitude, only to end up disappointed and bitter. When this happens, the person loses, his or her family loses, and ultimately the organization loses. The Air Force or any job owes you only one thing—the opportunity to compete and serve!

As a Leader, You Must Reach the Acceptance Phase of Grief Faster Than the People You Lead

There are five traditional stages of grief: denial, anger, bargaining, depression, and acceptance. When a challenge arises in your organization, it is important that, as a leader, you reach the final stage long before your people do. In 1993 I took command of the 22nd Air Refueling Wing at March AFB in Riverside, California. A few weeks after taking command, we had an operational readiness inspection (ORI), and the Airmen performed brilliantly! I was so proud. On the last day, we all gathered in the base theater for the outbrief. Horns, bells, and whistles were going off, and everyone was pumped about getting the ORI grade because they had worked so hard to do a great

job. The inspector general (IG) took the stage, and in the first of four categories we got a "high satisfactory," and in the second category we got a "high satisfactory." As the briefing progressed, the noise level got lower and lower because everyone knew what was coming. That's right, an overall "high satisfactory"—which really just means a "satisfactory." The IG then got up and left, leaving me, the wing commander, in this room with these tremendous people who had done a wonderful job, but it felt like all the oxygen had been absolutely sucked out of the place. You could have heard a pin drop. Now, as the leader, what was I to do? I had five options: denial, anger, bargaining, depression, and acceptance. I thought long and hard about what to say, and, having reached acceptance faster than the folks in the room, I came up with the following: "The IG is a great group of individuals who have come here with a difficult task, and we are all better off because of their feedback. But I'll tell you what I think. I think that grade is the biggest bunch of 'BS' I've ever heard of."

At first there was no reaction to my remarks, but then the entire room erupted in shouts and cheers! All I had done was reach acceptance of our final grade and then put into words what everyone else in the room was thinking. However, imagine my surprise when we all went to the club to celebrate the end of the ORI and saw that a videotape of me making my statement about the grade was on a permanent television loop for everyone to see and hear, over and over again! As a leader, you must get through all the stages of grief before your people do, so you can *lead* them through the tough times.

It's Not about *You*!

The sooner you can wrap your mind around this one, the sooner you can focus on what's right and get out of your own way. Leadership is not about you; it's about the organization and the people who work in it. As a leader, you set the tone of the organization and give your folks the tools to succeed; then you must get out of the way and let them do their jobs! Let's take a lesson from sports. Professional football teams have coaches—folks who devise the strategies and the plays. They look at the team's talent and put the right players in the right position for the best possible outcome, but they are not out there running the ball—their players do that. As a leader, it's your job to put the right folks in the right places to ensure mission success. I've seen too many leaders who were afraid to trust in their subordinates and the organization; consequently, the pride and attitude of the workers suffered. Leadership is not about, "Hey, look at me. I'm the leader. Look at what *my* organization has done." Those who pursue the awards, promotions, and accolades are often the ones who are exposed in time and eventually fall by the wayside. People see right through someone who has his or her own agenda, and that person's ability to lead is immediately sacrificed. Leaders have to understand that it is about the people, the organization, and its mission.

A few years ago, my spouse reminded me that it is indeed not about me. We were at a conference, and during the course of the meeting, I was asked a certain question several times. I don't recall the question, and it's not important. But I do remember being asked this question what seemed a dozen times, so, to be quite honest, I was tired of hearing it and tired of answering it. While we were seated at dinner that night, a young cadet happened to ask the very same question again, and without hesitation I gave him a halfhearted, emotionless answer. My mannerisms reflected my frustration with the question, and my answer simply vocalized it. Overhearing what I had said, my spouse squeezed my arm and said, "Honey, I know you've heard that question a dozen times, but that's the first time that cadet has ever asked it." She was absolutely right. The cadet didn't know how many times I had been asked that question, nor did he care. He only knew that he had asked it and wanted an answer. I immediately sought him out and gave him the right answer with the right attitude. Remember, it's not about you! (Postscript: This also applies to every promotion ceremony, parade, and speech you will ever attend or participate in. You must be enthusiastic and

sincere, no matter how many times you have done it before!)

You Want People with Ambition Working for You, Not Ambitious People

My father taught me this statement a long time ago. As a leader, you want people with ambition working for you—those are the folks who are goal oriented and possess a willingness to strive for excellence. They are the ones who are willing to do what it takes to fulfill the mission, whether it's staying late or working harder to ensure that the goals and mission of the organization are complete. On the other hand, ambitious people often have an ulterior motive behind their actions—motives shrouded in "What's in it for me?" versus "What's good for the organization?" As a leader, you will have to know the difference.

You Never Know When You Are Going to Make a Difference

In 1996 I became commandant of cadets at the Air Force Academy. In my first two years, nine cadets died due to rock-climbing accidents, car accidents, aircraft accidents—and one to pulmonary edema at high altitude. She was a third-class cadet (a sophomore), a 19-year-old who was sharp as a tack! At the memorial service in the Cadet Chapel, I steeled myself to go and talk to her mother and father. What could I say? This family had given its national treasure to the Air Force, and she dies during training. In this moment, how could I attempt to assuage her parents' grief? I walked up and introduced myself to her mother. "Ma'am," I said, "My name is Steve Lorenz." She immediately stopped me and said, "I know who you are, General Lorenz—my daughter told me about you. She had just earned her superintendent's pin for getting good grades, and you saw her on the terrazzo where all the cadets formed up and congratulated her for doing a great job. She immediately went back to her room and called us to say, 'The commandant of cadets told me how proud he was of me for earning the superintendent's pin.' " This conversation with the mother is especially poignant to me because I do not remember talking to this young cadet at all. But this is what the mother remembered. In a few seconds, I had made a difference in someone's life. You truly never know when you are going to make a difference.

Another example. During my tenure on the Joint Staff, I worked several layers below the man I consider one of the greatest military officers of our time, Gen Colin Powell. Now, before the days of e-mail, we used to hand-carry correspondence into his office. I distinctly remember going to his executive officer's desk one day to deliver a staff package. As I turned to leave, a major entered the room with his grandmother and said, "Grandmother, there is General Powell's office." At that precise moment, General Powell came out of his office to retrieve a package. Seeing the major wearing his Joint Staff badge and his guest, he asked, "Major, is this your grandmother?" The major said, "Yes," and then I saw General Powell gingerly take this lady's hand and for the next couple of minutes tell the grandmother what a great job her grandson was doing and how without his support he would be unable to do his job. General Powell then reached into a desk drawer, presented the grandmother with a Joint Staff pin, and said he was off to a meeting, but he thanked her again for allowing her grandson to serve. As soon as his door closed, I turned to look at the grandmother, and you could certainly see that her heart was aflutter—and so was mine. You see, in less than a minute, General Powell had made a difference in her life, the major's life, and my life. It takes only a moment to make a difference, and you may never know when that moment will present itself.

Being in Our Profession Is All about Service to Others

I am reminded of the photograph of the chief master sergeant stationed in Iraq who, after working a full 12-hour shift, would go to

the inpatient ward and hold a wounded Iraqi child who had lost her entire family. To me, this is what being in the military is about. It's all about service. Harking back to the days when civilians referred to someone who joined the military, oftentimes they didn't say, "He joined the Air Force" or "He joined the Army." Instead they said, "He joined the service." Why? Because that's what we're all about—service to others. I imagine that after his long shift, the good chief just wanted to go back to his tent and unwind, but he had made a commitment to make a difference and was prepared to execute that duty, no matter the cost. This is a lesson we can all use. When we raise our right hands to take the oath or when we put on our uniforms, we are saying, "I want to serve" and "Send me; I'll go." There is no distinction between being in the military and serving—they are one and the same.

What Will Your Leadership Legacy Be?

In my office, I have a quotation framed and positioned on my desk where I can see it every day. It says, "My biggest fear is that I will look back on my life and wonder what I did with it." Sooner or later, it will be time for all of us to hang up our uniforms and find something else to do. As I look back over my career, I continually wonder if I have done enough—if I have done all that I could to make a difference and be a positive influence on others. I hope I have.

Last year, I was lucky enough to be able to travel with the chief of staff to Balad in Iraq. We visited the hospital there, and one of the many individuals I talked to was an Army lieutenant colonel—a tall, thin, lean, and gaunt man with dark circles under his eyes. He was very tired! He was a battalion commander who had been in the country for 11 months and was visiting one of his wounded troops. After chatting for a few minutes, I backed away from him to the other side of the tent, and people began to flow between us. As I stood there watching him, I said to myself, "You know, Lorenz, you've been a commander several times in the last 35 years. I just hope you are a good-enough leader to lead someone like that." You see, you must never, ever stop trying to be the best leader you can be. ❑

While modern equipment, technology and capability are essential to success, your Airmen are the bedrock of America's ability to succeed in an era of challenge and uncertainty.

—2007 U.S. Air Force Posture Statement

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

Ricochets and Replies and Presenting the Latest *Chronicles Online Journal* Articles

Air and Space Power Journal (*ASPJ*), the professional journal of the US Air Force, encourages worldwide debate about military topics by publishing articles that critique current methods and propose new ideas. Because feedback from readers is central to sustaining this debate, the *ASPJ* staff facilitates such commentary via "e-mail the editor" links throughout the *ASPJ* Web site. We receive numerous "Ricochets and Replies" from readers responding to articles. Authors, fellow *Journal* readers, and staff members are all interested in audience reactions to published articles, so we forward Ricochets and Replies to authors for their reaction and publish selected ones in each quarterly issue. Because a given article may appear in multiple *ASPJ* language editions, we might receive Ricochets and Replies in any of those languages; we translate that correspondence to bring about international discussion of articles that strike a responsive chord among our audience. Few other journals reach readers in six languages to stimulate the free exchange of ideas among the world's military professionals.

ASPJ publishes comments in different formats, depending on their length and the writer's preferences. Brief remarks may appear in the Ricochets and Replies section if commentators give the *Journal* permission to publish them. *ASPJ* may coordinate with readers to publish longer responses as separate "Merge" articles that "succinctly present opposing viewpoints about controversial topics."* A series of Ricochet and Reply or Merge articles can continue for several *ASPJ* quarterly issues. A few commentators prefer to keep their responses private, and we respect that choice. Ultimately, some articles spur readers to write entirely new articles, perpetuating the cycle of professional debate that *ASPJ* encourages. If you have a comment about any *ASPJ* article, please send it to us at aspj@maxwell.af.mil.

All *ASPJ* editions promote professional dialogue among Airmen worldwide 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 or constraints regarding article length, *COJ* can publish timely articles anytime about a broad range of military topics.

Articles appearing in *COJ* are frequently republished elsewhere. The various *ASPJ* language editions routinely translate and print them. Book editors from around the world 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):

- Dr. Stephen R. Schwalbe, "The World's Fireman and Its Lily Pads: The Case of K2" (http://www.airpower.maxwell.af.mil/airchronicles/cc/schwalbe5.html)
- Richard L. DiNardo, "From Bucharest to the Baltic: German Air Operations on the Eastern Front, 1916–1917" (http://www.airpower.maxwell.af.mil/airchronicles/cc/dinardo.html)

*Lt Col Paul D. Berg, "Introducing 'the Merge' and the Latest *Chronicles Online Journal* Articles," *Air and Space Power Journal* 20, no. 1 (Spring 2006): 10, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/spr06/spr06.pdf.

The *ASPJ* staff seeks insightful articles and book reviews from anywhere in the world. We offer both hard-copy and electronic-publication opportunities in Arabic, Chinese, English, French, Portuguese, and Spanish. To submit an article in any of these 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. ❑

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.*

CHINESE SERVICEMEN'S VIEWS OF USAF AIRMEN AND EDUCATION

I read Sr Col Wang Qigui's section of the article "Chinese Servicemen's Views of USAF Airmen and Education" (Winter 2007) with great interest to gain a perspective of what a communist political commissar thought about the American military system that operates without "political units or political officers" (p. 53). Colonel Wang essentially equated service chaplains, symbols of America, unit identification, military museums, and mottos with China's "political education" (p. 53). However, readers should be aware that in communist military forces, political education is closer to propaganda, with which personnel must demonstrate familiarity in order to advance, and that political officers do much more than teach propaganda. Even today, communist political officers review and approve operational military orders at all levels of command. Note that Colonel Wang did not try to make this comparison with the American military.

Col Steve Schwalbe, USAF, Retired
Cheney, Washington

"Chinese Servicemen's Views of USAF Airmen and Education" contains three good articles. The authors pretty much "got it." I wonder, though, what these officers' reports to their People's Liberation Army Air Force superiors looked like and to what extent their internal reports were affected by politics. Nevertheless, I enjoyed the articles and would like to see more of the same from other foreign visitors.

Maj Michael Markovitch, USAF, Retired
Monterey, California

NASH IN NAJAF

I read with great interest Dr. Hank Brightman's article "Nash in Najaf: Game Theory and Its Applicability to the Iraqi Conflict" (Fall 2007). As the author admits, though, by concentrating on the potential for Pareto improvement between indigenous security forces and domestic insurgents, his analysis vastly oversimplifies the internal dynamics of the Iraqi domestic situation. An alternative game-theory scenario that he ignores is the potential for Pareto improvement between the Kurdish, Sunni, and Shi'a blocks that could result in greater cooperation between those interests and, therefore, improved stability. Using his same line of reasoning, one sees that the longer the multinational coalition maintains a security environment in Iraq, the more likely these three interest groups will communicate and cooperate, shifting from Pareto optimal (highest payoff for each group) to Pareto improved strategies resulting in Nash equilibrium. Game theory would seem to support a wide range of outcomes, depending on the analyst's perspective and baseline assumptions. Public-diplomacy initiatives can be a valuable tool in the ongoing effort to boost the odds in favor of greater regional stability

and a Pareto improved outcome more in line with our national interests.

Lt Col Peter W. Farney, USAF
Fort Meade, Maryland

THE HYPHENATED AIRMAN

In response to Lt Col Robert Poynor's article "The 'Hyphenated Airman': Some Observations on Service Culture" (Fall 2007), I would say that the Air Force seems to be undergoing the same identity crisis found in some monopolistic corporate megabrands. These companies enjoy the resources brought by their massive success, which allow them to foray into new territories, but because they lack a significant opponent, these forays become increasingly unrelated to their original core identity. When a viable opponent arises, they find themselves bloated and lethargic, unable to compete against a more focused entity with clearer direction and purpose. Often, to save the company, good chief executive officers (CEO) must sell off parts of the company that cannot be brought directly into support of its main focus. They concentrate on "branding," maintaining a clear image that their customers can associate with a specific task or purpose. Striving against this new opponent can galvanize the once disparate elements of the team and bring them together under a unified direction.

These same principles apply to government organizations. In fact, such organizations are much more susceptible to this bloating and lethargy because they so seldom face any real competition. The Air Force has enjoyed so many years of air superiority that it no longer pursues real airpower with the sense of purpose that it did 20 years ago. Having achieved its main goal, it does not feel the need to press onward, so it presses sideways. Future operations planners explore supporting systems, such as various technologies, as though they were ends in themselves. Being part of a supporting system that is treated as an end in itself is an especially ambiguous role for Airmen to fill and, I think, is the root cause of the tribalism and struggle for identity that Colonel Poynor discusses. It is only natural then, that the commander, Air Force forces struggles to maintain control of these separate entities under the joint force commander. Similarly, it should surprise no one that Airmen in supporting systems claim that members of the warrior class don't understand them.

This problem might be best solved using the same technique that CEOs use in the private sector. The Air Force must recognize that it is no longer a single force. It is a conglomerate: an amalgam of forces operating under a single administration to exploit the advantages of centralized logistical and financial support. In order for the Air Force to regain its unity of command, there must be some negative consequence for pursuing research and operations that do not directly support a central mission, and that mission, as Colonel Poynor points out, cannot be defined by the existence of these disparate entities. If the various teams that make up the Air Force cannot be brought together in support of one central theme, then everyone involved would be better off if the tangential teams were severed.

CPT Morgan Knighton, USA
Fort Lewis, Washington

REVISITING LEADERSHIP IN THE ARMED FORCES

Thanks for publishing Air Commodore Aslam Bazmi's worthy treatise "Revisiting Leadership in the Armed Forces" (Fall 2007). It's one of the best articles I've ever read! The air commodore captures in a few lines all the leadership lectures and books we have absorbed over the years. It should be required reading in all professional military education programs. Excellent work!

CMSgt James A. Morrow, USAF, Retired
Beavercreek, Ohio

I just finished Air Commodore Bazmi's fine article. As I read it, I kept thinking to myself how much it reminded me of an Air Force officer I know who personifies many of the attributes that Air Commodore Bazmi describes. Thank you for encouraging good leaders with such candid, principled, and smart information.

Kathryn A. Drake
Papillion, Nebraska

A RESCUE FORCE FOR THE WORLD: AN AUTHOR REPLIES

After reading Lt Col John Taylor's comment (Ricochets and Replies, Winter 2007) about our article "A Rescue Force for the World: Adapting Airpower to the Realities of the Long War" (Fall 2007), I agree that there is no doubt that all combat search and rescue (CSAR) weapon systems are under significant and sustained operations-tempo pressure. That being said, our article does not make an all-or-nothing proposition—we can wade in if we're not ready to dive in. For example, rescue can begin doing the following things today:

- Stop talking about engagement events that CSAR has supported as one-time operations that were brief diversions from the "real job." Connect the dots for people up and down the chain of command to draw a compelling picture of the strategic significance of those engagement events.
- Begin learning about the organizations and processes that are relevant to the operating concept that our article describes. There is much to learn about joint task force organization, combatant commander (COCOM) staffs, interagency coordination, and nongovernmental organizations.
- Arrange to put the right people onto COCOM and joint staffs. Doing so will benefit CSAR's traditional role as well as the one described in the article. Writing CSAR's capabilities into theater security cooperation plans will be a good use of time as the Air Force waits for CSAR's taskings to abate somewhat.
- Begin defining the professional-development career path that rescue's special breed of "long warriors" must walk. For example, does your wing have a foreign-language program? Do you plan to conduct any Lightning Bolt exercises this year? If so, why not do them somewhere in the US Southern Command area of responsibility instead of the Avon Park range in Florida? Are irregular-warfare doctrine and reports from West Point's Combating Terrorism Center on your professional reading list? From a pure CSAR point of view, those things may not appear directly relevant to your daily work, but now they are.
- Let special operations forces (SOF) be SOF. Spend what little extra training time you have doing what you do best, not trying to become something that you are not. We must still address the growing feeling that the CSAR community has forgotten its basic purpose—that it has "lost its soul." Our mission is noble, challenging, and chock-full of strategic relevance, so go after it.

Getting from a concept to an actionable plan will take time and effort. Most of all, though, it will take commitment to the basic notion that neither the Air Force nor rescue need be irrelevant in the ideological struggle that defines the global war on terror. If units are too busy right now to join that struggle, then take advantage of opportunities to be ready when the time is right.

We must realize that without a validated concept, one cannot define a requirement. Our article informally introduced the concept and set the stage for more detailed thinking about capabilities, implementation, and requirements.

Lt Col Marc C. DiPaolo, USAFR
Fort Belvoir, Virginia

A RESCUE FORCE FOR THE WORLD

Not to denigrate the article "A Rescue Force for the World: Adapting Airpower to the Realities of the Long War" by Lt Col Marc DiPaolo and others (Fall 2007), but is the Air Force trying to reinvent the wheel? Anyone who visits the Air Force archives and reads the mission reports for the HH-43 Huskie helicopter that the Air Rescue Service (later the Aerospace Rescue and Recovery Service [ARRS]) flew from 1959 to 1975 would find that those units fulfilled most of the missions that Colonel DiPaolo and his coauthors discuss in their article.

A good example is a description of the civic-action program conducted from January

to March 1969 by Detachment 3, 38th ARRS, 3rd Aerospace Rescue and Recovery Group, based at Ubon Royal Thai AFB, Thailand. According to the *History of the 38th Rescue and Recovery Squadron, 1 Jan 1969–31 Mar 1969*, prepared by Maj James L. Wissert, Detachment 3 flew nine civic-action medical airlifts that quarter in support of Operation Medic-Lift. Working in conjunction with the base civil-action officer, Detachment 3 airlifted medical teams and Thai public-health officials to nearby villages where doctors and nurses saw approximately 200 to 300 patients and where dentists extracted an average of 50 teeth per visit. The Thai people were very interested in the HH-43 that went by the call sign Pedro. Immediately after the helos landed, Pedro aircrews would pass out photos of the HH-43 to the excited and curious children who surrounded them.

Not only did the venerable Huskie perform combat search and rescue (CSAR) missions in enemy territory without an in-flight refueling capability and either with or without protective rescue combat air patrols, but also its crews wrote the original procedures for CSAR. During the Vietnam War, the HH-43 completed more combat rescues—1,893—than either the HH-3 or HH-53 helicopters. At one time, there were 100 HH-43 detachments worldwide, with aircraft based in the United States, Canada, Greenland, Europe, Turkey, Libya, the Azores, Ethiopia, New Guinea (on a temporary-duty basis), Japan, Okinawa, Korea, the Philippines, Guam, Thailand, and Vietnam.

Prior to deploying to Southeast Asia, in the two-year period beginning 31 January 1962, HH-43 crews saved 262 military and civilian lives and assisted 1,473 other persons. Many of these people were rescued from precarious situations and would undoubtedly have died without the help of the HH-43. In addition, Huskies scrambled 12,613 times to assist aircraft in trouble. Local base-rescue detachments worldwide helped rescue foreign nationals and participated in civic-action programs, medical evacuations, and, in the United States, the Military Assistance to Safety in Traffic program. During its 16 years of operational service, the HH-43 Huskie rescued more people than all other types of helicopters, a record that still stands.

MSgt Stephen Mock, USAF, Retired
Libby, Montana

DEFINING INFORMATION OPERATIONS FORCES

In their article "Defining Information Operations Forces: What Do We Need?" (Summer 2007), Maj Timothy Franz and his coauthors correctly identify the Air Force's lack of an information operations (IO) career field as a factor that limits "the potency and maturity" of both network warfare and influence-operations forces (pp. 57, 58, 60). Indeed, at the IO commanders' conference hosted by Air Combat Command in April 2007, one commander after another identified an "inability to retain expertise and advance careers" as a problem that severely limits the Air Force's IO capability. However, establishing a career field is only one of the numerous challenges facing the Air Force's emerging IO capability.

The Air Force must also organize intelligently to integrate full-spectrum air, space, and cyberspace options into a combatant commander's campaign. Momentum continues to build behind Air Force Cyber Command; however, the vehicle by which our joint force air component commanders command and control all aspects of airpower is the numbered air forces' air and space operations centers (AOC). In order for the Air Force to become a true air, space, and cyberspace force, Cyber Command's development must be accompanied by a concurrent effort to prepare our AOCs to command and control cyberpower.

Additionally, the Air Force must systematically train its entire force, not just IO or cyberwarriors, on IO. Only a full-court press, including flag and theater exercises, Air Force Weapons School, Air Force specialty code–awarding courses, and courses taught in all developmental-education programs, will successfully infuse IO into the Air Force's culture.

Finally, the launching of Cyber Command must not exclude the continued maturation of the Air Force's influence-operations capabilities such as psychological operations (PSYOP),

military deception (MILDEC), operations security, counterintelligence, public affairs operations, and counterpropaganda. An inclination towards technology may predispose our corporate culture to focus on dominating the cyberdomain, but, ultimately, all warfare—especially the current ideological struggle—is won in the cognitive battlespace.

Although IO is an emerging endeavor, we can build upon experienced resources. Both the Joint Information Operations Warfare Command and the Air Force IO Center have conducted a variety of research projects and have collected numerous lessons learned. The Army's 1st IO Command has quickly become a center of excellence, and the electronic warfare, space, MILDEC, and PSYOP communities are already well established.

Information is a fundamental aspect of national power, and IO is crucial throughout the spectrum of conflict. Our Air Force faces critical choices about organizing, training, and employing IO. These choices will determine whether we truly intend to be an Air, Space, and *Cyberspace* force.

Maj Brian J. Tyler, USAF
Ramstein AB, Germany

One need only read "Defining Information Operations Forces: What Do We Need?" to come to the rapid conclusion that these capabilities of information operations (IO) are cats and dogs living together. Let's get the doctrine right by taking the following steps.

First, divide all operations into "objective" and "subjective" categories. Objective operations are those conducted primarily in the physical domains of air, space, and cyberspace to create physical effects. Subjective operations, which target the cognitive domain to influence perceptions and decision making, include strategic communication, psychological operations, and military deception. Second, eliminate the fictitious "information domain" and create a doctrinal category of cyberspace operations. Third, recognize that IO is neither kinetic nor nonkinetic but the synthesis of operations designed to influence an adversary's decision making. If we take these steps, we won't have the unpalatable task of trying to create an "IO career force" but can create a career force that understands IO intuitively at all levels of war.

Maj Geoffrey Weiss, USAF
US Marine Corps University, Quantico, Virginia

THE AIR FORCE'S MISSING DOCTRINE

In his interesting and enjoyable article "The Air Force's Missing Doctrine: How the US Air Force Ignores Counterinsurgency" (Spring 2006), Maj Kenneth Beebe seeks to explain the need to draft a suitable counterinsurgency (COIN) doctrine to guide the US Air Force to victory in future battles. In doing so, he highlights the limitations of the previously available doctrine on that topic and, based on lessons learned in previous conflicts, proposes a doctrine that is essential to COIN warfare.

In my opinion, this article points out a major problem that the Air Force has faced for many years; on this subject, Dennis Drew's article "U.S. Airpower Theory and the Insurgent Challenge: A Short Journey to Confusion" in the *Journal of Military History* (October 1998) constitutes an indispensable reference. I also congratulate the US Air Force for the publication of Air Force Doctrine Document 2-3, *Irregular Warfare*, on 1 August 2007. Major Beebe's article needed to be published so that *Air and Space Power Journal* readers would be fully informed about the critiques, discussions, and analyses that preceded this important new Air Force doctrine document.

As far as Major Beebe's article is concerned, it is worth emphasizing that it covers the subject quite well, clearly poses the problem, and offers a title consistent with the contents.

Dr. Wautabouna Ouattara
Abidjan, Ivory Coast

Editor's Note: Dr. Ouattara read the French version of the article, available at http://www.airpower.maxwell.af.mil/apjinternational/apj-f/2007/hiv07/beebe.html. Major Beebe has been promoted to lieutenant colonel since his article first appeared.

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

Doctrine and Technology

GEN CURTIS LEMAY once stated, "At the very heart of warfare lies doctrine. It represents the central beliefs for waging war in order to achieve victory. Doctrine is of the mind, a network of faith and knowledge reinforced by experience which lays the pattern for the utilization of men, equipment, and tactics. It is the building material for strategy. It is fundamental to sound judgment."[1] Airmen might agree with General LeMay in principle, yet doctrine and technology coexist uneasily in today's Air Force. Airmen's eyes are apt to glaze over at the mere mention of the word *doctrine*, yet *technology* conjures up exciting visions of sophisticated equipment. Perhaps Airmen view doctrine as being akin to broccoli—healthy but boring. Referring to doctrine, some Air Force doctrine manuals declare that "Airmen should read it, discuss it, and practice it," yet persuading Airmen to read the dozens of Air Force doctrine manuals published over the past decade poses a challenge.[2] If Airmen are not internalizing the latest doctrine, then we have a problem.

Doctrine deserves respect because it has been intertwined with technology for millennia and explains how to use technological tools to achieve military purposes. Skillfully integrating doctrine and technology can lead to victory, but technology without doctrine to guide its use has little military significance. Perhaps the most technologically oriented military service, the Air Force aggressively promotes technological development and seeks ways to translate it into improved operational capability. That process also functions in reverse when doctrinal requirements to perform a military activity spur efforts to develop the requisite technologies. Unfortunately, the Air Force can only partially control its technological destiny because the service generates only a fraction of the world's air, space, and cyberspace advances. We must therefore monitor a wide array of technological innovations, including those that may not at first appear relevant to our operational domains, and be prepared to adapt quickly to them. Cyberspace technologies are evolving at an incredible rate, and the Air Force is striving to formulate new doctrine for that vital operational domain, but we also need to realize that existing technologies exert a powerful influence on doctrine. Possessing proven technologies such as those that make possible stealth aircraft and precision-guided munitions offers a strong incentive to refine doctrine for their employment. We need updated doctrine for existing technologies, but new technologies can suddenly render old ones obsolete. Ideally, doctrine should be both flexible enough to meet changing operational conditions and visionary enough to justify developing new technologies.

Doctrine may have a reputation for dullness, but Airmen still manage to learn about it. The Air Force is working diligently to distill the latest combat experiences and technological innovations into doctrine. Even if Airmen seldom read doctrine manuals, the wisdom they contain still seeps almost unnoticed into the tactics manuals and force-development curricula to which Airmen are constantly exposed, ensuring that personnel absorb many essential doctrinal concepts. As a force-development tool, *Air and Space Power Journal* dedicates this issue to advancing the professional dialogue about how doctrine and technology affect air, space, and cyber operations. ❑

Notes

1. Quoted in Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, 1, http://www.dtic.mil/doctrine/jel/service_pubs/afdd1.pdf.

2. For examples, see AFDD 2-3, *Irregular Warfare*, 1 August 2007, vi, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2_3.pdf; and AFDD 2-3.1, *Foreign Internal Defense*, 15 September 2007, vi, http://www.dtic.mil/doctrine/jel/service_pubs/afdd2_3_1.pdf.

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.*

We Are at War with Terrorists, Not Muslims

LTC Michael R. McGee, USA, Retired*

AFTER READING COL William Darley's article "Strategic Imperative: The Necessity for Values Operations as Opposed to Information Operations in Iraq and Afghanistan" (Spring 2007), I believe that the author misconstrued the nature of the current conflict by labeling it "strife between civil religions."[1] In point of fact, the national security strategy of 2006 explicitly states that "while the War on Terror is a battle of ideas, it is not a battle of religions."[2]

I do concur that we are engaged in a very different kind of war. However, we must be careful to state that this war is with terrorists, not with the Muslim populations of Iraq or Afghanistan.[3] We are chasing criminals—not fighting a nation's army. This distinction is important because it changes the dynamic that exists between the US, Iraqi, and Afghan governments (i.e., they can join us in the pursuit of criminals only if we are not fighting their countries).

According to Colonel Darley, "Culture . . . is the battlefield. Therefore, we must logically and frankly understand the end objective as the transformation of those cultures and the values that underpin them in a manner that makes them compatible with the values underpinning our own culture and political objectives for being at war."[4] I disagree with this construction. First, the United States' end objective is not the transformation of cultures. Second, we do not intend to make other cultures' values "compatible with the values underpinning our own culture." The United States is trying to spread democratic ideas (hence a "battle of ideas"), but we are not trying to conquer anyone; nor are we trying to impose our "civil religion" on the Muslim world.

Later in his article, Colonel Darley says,

> In other words, to attain conditions conducive to democracy, the Iraqi people should shift the Koran to the same respected cultural niche within their society that the Judeo-Christian Bible now occupies in developed Western democratic societies—a resource for examining the traditions and wisdom associated with the history of Islamic moral judgments but entirely excluded from official legal standing as representing the authority for enforcement of civil law.[5]

First, his presumption that the goal is to "attain conditions conducive to democracy" ignores the reality of Islam, in which no separation of religion and state exists. Next, he focuses on Iraq and its people as if that country were somehow the bellwether for Muslim culture in the wider Middle East—implying that if Iraqis would only comply by "shift[ing]

*The author, who retired after 20 years in the US Army, currently works in the Intelligence, Surveillance, and Reconnaissance Functional Integration Office of the National Security Space Office.

the Koran to the same respected cultural niche," the rest of the Muslim world would follow. This is wishful thinking at best; more importantly, it is not palatable to Middle Eastern culture and therefore not helpful for furthering US foreign policy. Better to accept the reality of the Muslim state and work to enrich its cultural fabric than to try to destroy those manifestations of that civilization that we find unacceptable.

From the above, I infer that no route to democracy passes through the gate of Islam; further, there is no acceptable path to a place where the Muslim community can absorb and live out unabridged Western ideas (culture or civilization). The fact that America would like Muslims to "delink Islamic religion and religious clergy" does not mean that Muslims feel they *can* do so, which does not even address whether they *want* to do so.[6]

Some authors (often professors at US colleges and universities) write that Islam is compatible with Western ideas about democracy.[7] However, "prominent Muslim scholars argue democracy to be incompatible with their religion. They base their conclusion on two foundations: first, the conviction that Islamic law regulates . . . every area of life, and second, that the Muslim society of believers will attain all its goals only if the believers walk in the path of God. In addition, some Muslim scholars further reject anything that does not have its origins in the Qur'an."[8]

As an illustration, note the following:

> Islam is a complete way of life. . . . The preeminent rule which the Islamic state must observe is stated in the Qur'an. . . . It is clear that the state's obligation of obedience to the Creator is as important as the obedience of the individual. Hence, the Islamic state must derive its law from the Qur'an and Sunnah. *This principle excludes certain choices from the Islamic state's options for political and economic systems, such as pure democracy,* unrestricted capitalism, communism, socialism, etc.[9] (emphasis added)

If we are to succeed in Iraq (and the Middle East), we cannot simply dismiss those elements of culture and civilization with which we disagree. Instead, we must acknowledge them, find means to discuss their application in new ways, and, finally, help Muslim leaders and their populations use those new methods to solve real cultural (social, economic, educational, etc.) issues throughout the Middle East. The United States should concentrate on helping to transition Muslim culture into the twenty-first century; killing terrorists is also necessary but almost incidental.

Michael Rubin notes that, as with all societies, "until Arab citizens hold their leaders accountable, in the press, on the Internet, and on the street, the democracy debate will be moot."[10] Here, Rubin speaks of the broader Middle East, but the application seems clear: cultures which lack a venue for open discourse on issues of concern to the populace that composes it are innately incapable of sustaining representative governments (including democratic ones). As part of the worldwide Islamic culture, Arab Muslims must decide to act and establish this environment so that debate can be open and forthright. This is a tall order for societies accustomed to poverty, authoritarian leaders, lack of personal freedoms, poor economic growth, lack of advanced education, and underfunding of research in science and technology—all within a culture permeated by a religion with an innate belief in its own righteousness.

America cannot "win" a cultural war with the Muslim world, and we should not let anyone tell us that this is what we are really doing. Instead, America must be satisfied (over the long term) with encouraging academic endeavors that leverage Muslim scholarship where the benefits can propel economic and political capital that is inextricably linked to developing formal self-awareness and incentives to join the globalization efforts of Western civilization. We should promote all reasonable means that encourage Muslims to expand their mental, societal, economic, or religious endeavors. We need an integrated, holistic strategy and the requisite plan of execution so that all appropriate elements of our government can participate. ❑

Woodbridge, Virginia

Notes

1. COL William M. Darley, "Strategic Imperative: The Necessity for Values Operations as Opposed to Information Operations in Iraq and Afghanistan," *Air and Space Power Journal* 21, no. 1 (Spring 2007): 39, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj07/spr07/spr07.pdf.

2. *The National Security Strategy of the United States of America* (Washington, DC: The White House, March 2006), 9, http://www.whitehouse.gov/nsc/nss/2006/nss2006.pdf. The strategy does not use the term *civil religions*.

3. Note that the term *global war on terror* is not useful. First, it is a poor choice of words (i.e., how does one make war on *terror*, a noun that means fear, horror, fight, dread, and so forth?). Second, we might prosecute those who use terror tactics or who commit terrorist actions, but we cannot make war on a concept, method, or emotion.

4. Darley, "Strategic Imperative," 33.

5. Ibid., 39.

6. Ibid.

7. See, for example, David Bukay, "Can There Be an Islamic Democracy?" *Middle East Quarterly* 14, no. 2 (Spring 2007): 71–79, http://www.meforum.org/article/1680; and Najib Ghadbian, "Democracy or Self-Interest? An Investigative Look into Islamic Democracy and US Policy," *Harvard International Review* 25, no. 2 (Summer 2003): 78–79, http://hir.harvard.edu/articles/1128.

8. Bukay, "Can There Be an Islamic Democracy?" 77.

9. "Ten Misconceptions about Islam," in *USC-MSA* [Muslim Students Association] *Compendium of Muslim Texts* (Los Angeles, CA: University of Southern California, n.d.), http://www.usc.edu/dept/MSA/notislam/misconceptions.html.

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Network-Centric Operations

A Need for Adaptation and Efficiency

CDR Phillip G. Pattee, USN, Retired*

IN AN ARTICLE published in 1998, Vice Adm Arthur K. Cebrowski and John J. Garstka argued that "network-centric warfare and all of its associated revolutions in military affairs grow out of and draw their power from the fundamental changes in American society. These changes have been dominated by the co-evolution of economics, information technology, and business processes and organizations." At that time, the authors noted that three themes governed the path that the military would take to change the way it conducted operations:

- The shift in focus from the platform to the network
- The shift from viewing actors as independent to viewing them as part of a continuously adapting ecosystem
- The importance of making strategic choices to adapt or even survive in such changing ecosystems.[1]

The Department of Defense (DOD) has made tremendous strides along the lines of the first theme by exploiting networks of high-technology weapons systems but little progress on the second theme, including—at the most basic level—understanding what it means. The third theme, a clarion call urging the military to change in order to remain competitive, should cause the national security establishment to reflect on the second theme and decide exactly what it wants to do about it. Back in early 1998, Cebrowski and Garstka asked, "How can the military not change?"[2] The military's biggest obstacle to change lies in its failure to rethink its rules as an actor among others in a continuously adapting ecosystem. Currently, the DOD focuses overwhelmingly on exploiting new technologies for military advantage, but these gains "are of marginal utility against a diffuse and elusive insurgency" such as the one pursued by al-Qaeda.[3] Only one actor among many in the national security environment, the DOD will not realize the promise of dramatically improved national security if it continues a nearly exclusive emphasis on exploiting new technologies for their value within the context of traditional military operations. Ensuring its continued viability requires a balance between exploitation and exploration: exploitation in order to promote efficiency and economy, and exploration in order to investigate radically new approaches to national security.

Networking Is Not New

Although the DOD has not precisely defined network-centric warfare, proponents identify "to network" as a verb, noting that the concept fundamentally concerns human behavior and the way humans behave "in the networked environment."[4] When referring to the environment, "network," as a noun, means an interconnected group or system, while "to network" denotes the act of interconnecting. Networking is not novel: humans have operated in a networked environment for millennia. The relevant point about networking involves determining which types of interconnections to encourage, permit, discourage, or restrict, as well as using new technology to

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foster desired networking but restrict the undesirable variety. Network-centric operations deal with shaping networks to exploit the emerging environment to one's advantage.

Networking for Exploitation

The Office of Force Transformation developed a construct for network-centric warfare as the intersection of four warfare domains: physical, informational, cognitive, and social (fig. 1). The physical domain includes the continuum of space and time. In the information domain "information is created, manipulated, and shared." The "mind of the warfighter" makes up the cognitive domain, and in the social domain, "humans interact, exchange information, form shared awareness and understandings, and make collaborative decisions."[5] In this paradigm, the information and cognitive domains intersect to form shared awareness, the cognitive and physical domains intersect to form compressed operations (planning, organizing, deploying, employing, and sustaining), and at the intersection of the information and physical domains, speed and access enable precision force. Although its proponents state that network-centric warfare "exists at the very center where all four domains intersect," they have not ascribed any importance to the social domain as a piece in the ecosystem.[6] Moreover, the model itself follows a narrowly defined mission for the military, based on deterring war and—when deterrence fails—fighting and winning the nation's wars. One finds evidence for this in the fact that the domains of *conflict* intersect to form the construct for network-centric *warfare*. The cognitive domain embodies the mind of the *war fighter*. The Office of Force Transformation's emphasis on warfare, conflict, and war fighter shows that its conception of network-centric operations represents a strategic choice to network within a narrowly defined social domain of military professionals for the conduct of strictly military operations.

This type of limited networking to exploit a war-fighting advantage has already produced an excellent precision force that has repeatedly demonstrated a battlefield advantage over less-networked adversaries.[7] With today's technology, only adversaries beyond sensor reach feel safe. For example, during Exercise North-

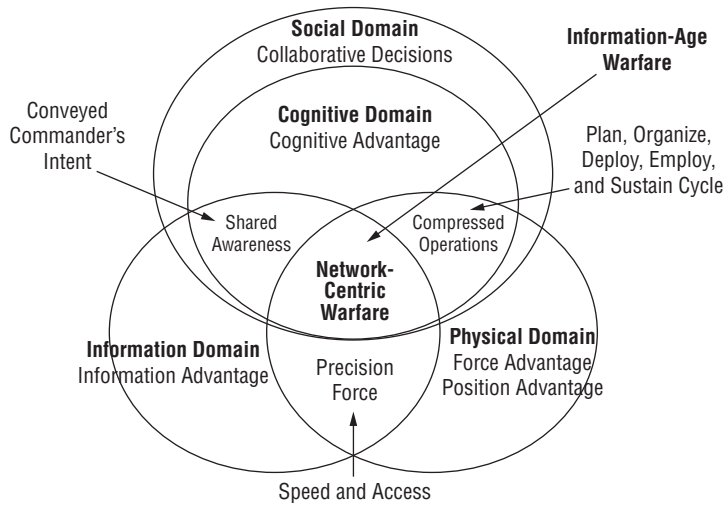

Figure 1. Information-age warfare—domains of conflict. (From *The Implementation of Network-Centric Warfare* [Washington, DC: Department of Defense, Office of Force Transformation, 5 January 2005], 21, http://www.oft.osd.mil/library/library_files/document_387_NCW_Book_LowRes.pdf.)

ern Edge 2006, the F-22 Raptor air-superiority fighter prevailed against 40 simulated enemy aircraft, achieving an impressive overall kill ratio of 108 to zero. Moreover, when operating in a network, the F-22, by using its onboard sensors to direct other aircraft's weapons, improved the performance of the older F-18s and F-15s.[8] Networking in this manner enables the best sensors to couple with the combined payload of all aircraft, effectively spiraling performance by combining the best attributes of each platform. The DOD has made tremendous strides along the path from platform-centered operations to network-centric operations, but this progress has little bearing on the second of the themes, "the shift from viewing actors as independent to viewing them as part of a continuously adapting ecosystem," mentioned above.

No reason exists for limiting the model of network-centric warfare to conflict since the physical world, information, cognitive processes, and social constructs apply equally well to other situations. Cebrowski and Garstka cite the example of Wal-Mart's shift to point-of-sale scanners to track weekly store sales. By providing this information directly to suppliers, Wal-Mart eliminated the platform-centric purchasing department at each store, thus reducing operating costs and improving control over its stock.[9] Sharing information to reduce its sales cost below the industry average enabled Wal-Mart to exploit its already dominant position in the retail sector.

Nevertheless, adopting similar strategies for the military, as in the domains-of-conflict paradigm, creates a culture that needlessly limits the joint force to network with allies and others in the DOD to improve the military's ability to conduct warfare. In fact, instead of conceiving new methods of national security, network-centric warfare's central point simply entails translating an information advantage into a competitive advantage for military operations.[10] Continuing down this road will likely lead the military to more effective operations, but the payoff on investment for improved national security remains uncertain. The United States armed forces have had no peer since the breakup of the Soviet Union.[11] America has produced the finest military in the world by following simple rules. To reiterate, the military exists and organizes itself to deter aggression against the United States and to fight and win the nation's wars when deterrence fails. If we continue to view the military's purpose as deterring and winning wars, will that guarantee national security in an evolving security environment? When Cebrowski and Garstka argued for network-centric warfare, they expected to incorporate the ideas and strategies used successfully by American businesses. One lesson from industry maintains that "dominance lies in making strategic choices appropriate to changing ecosystems" and, more to the point, that "simply pursuing operational effectiveness while adhering to an obsolete strategy is a formula for failure."[12]

Viewing the World as Complex Adaptive Systems

The shift from viewing actors as independent to viewing them as part of a continuously adapting ecosystem involves changing the way one thinks about the world. Every actor has the capability to interact in some fashion with its environment and with other actors. Groups of actors form populations, which, especially if the members act in concert, become actors in their own right. The way actors interact with the environment, other actors, or populations in pursuit of specific goals is a strategy. A pattern of interaction is a network. Actors and populations usually are part of multiple networks. Actors, their environment, patterns of interaction, and strategies compose a system whose properties emerge from the actions and interactions of the parts. Since components of the system change (i.e., new actors are born while others die; technologies can alter strategies and change the ability of actors to interact; actors vary their strategies; etc.), the system to which they belong changes continuously as well.[13] Sometimes change is slow and small—sometimes fast and furious.

Negative feedback dominates relatively stable systems. Adapting systems have a mix of positive feedback based on increasing returns

and negative feedback to keep them from degenerating into chaos. In this region of bounded instability, individual or collaborative creativity can produce new standards or rule sets. An initial advantage, when magnified by increasing returns, generates a successful paradigm that other actors will mimic and adopt. Once the standard becomes successful and widely adopted, those who deviate from it incur penalties—hence, negative feedback again dominates in the system and the standard becomes locked in.[14] This continues until new patterns emerge with new rules for success that eventually undermine the older system and replace it. Kevin Kelly, *Wired* magazine's executive director, refers to this process as sustainable disequilibrium or churn.[15]

The main elements that produce adaptive behaviors in these complex systems are the richness of interactions and variety.[16] The attractiveness of the new system to others who will voluntarily support and sustain it generates increasing returns. Various actors spontaneously self-organize around the attractors, and a new self-synchronizing system emerges from the bottom up.[17]

Networking for Exploration: Strategic Networking and Transformation

Strategic choice in a changing ecosystem deals fundamentally with recognizing emerging patterns, determining the rules or attractors governing the new order, and posturing oneself to take advantage of the new system as it develops. As an example, consider the rise of Wal-Mart to its position of prominence in the retail sector. Prior to 1962, competition from regional discount chains was squeezing out Sam Walton's few variety stores. Obviously concerned, he "traveled the country to study this radical, new retailing concept."[18] Instead of determining how he could find more efficiency in a local market, Walton increased his network to the national level, looking for emerging national trends. His interaction with other retailers and potential customers enabled him to recognize an emergent pattern. Convinced that this new retailing model was the wave of the future, Walton postured his business to take advantage of evolving shopping patterns by opening the first Wal-Mart in Rogers, Arkansas, in 1962.[19]

Convenience paired with value made this new retailing model attractive to consumers. Walton thought about his store from the point of view of the customer, providing a "wide assortment of good quality merchandise; the lowest possible prices; guaranteed satisfaction with what you buy; friendly, knowledgeable service; convenient hours; free parking; [and] a pleasant shopping experience."[20] As an actor, Walton mimicked the strategy already pioneered by other retailers such as Kmart and Target to tailor the store to attract shoppers by offering value and convenience.

In addition to the way he configured his stores, Walton used aerial observation to choose their locations.[21] During the 1960s and 1970s, many Americans bought homes in suburbs. Using an old airplane for observation, Walton could see where suburbs were growing and where populations of customers would be in several years' time, pick out likely traffic routes, and note the areas neglected by his competitors. By locating his stores conveniently for emerging shoppers, he created more frequent interactions with potential customers and immediately capitalized on developing local markets.

Walton recognized two rising patterns: consumers' new shopping preferences and customer locations / traffic routes. He dismissed the strategy of simply trying to make the best of his situation by improving the operating effectiveness of his Walton's Variety Stores—the emerging pattern signaled their demise, irrespective of their efficiency. Instead, Walton developed a strategy that created opportunity to interact with more customers and provide them with an attractive store by offering convenience and value. He did this by having a social domain much larger than that of the local economy and other variety-store retailers. The emergent system of customers, interactions, and attractors transformed Sam Walton's business and locked in Wal-Mart as a retail success.

A second example of revolutionary change comes from a depression-era truck driver from

North Carolina named Malcolm McLean. After World War II, the demand for trade and cargo continued to increase. The initial solution to the problem called for building larger freighters. In 1955 McLean acquired the Pan-American Steamship Company with the proceeds gained from the sale of his trucking firm and began to experiment with ideas to increase the throughput of cargo. His innovation took the form of using containers that could be unloaded from truck trailers and loaded onto ships. Despite initially slow progress, in 1961 the International Standards Committee established containers measuring 20 x 8 x 8.5 ft. and 40 x 8 x 8.5 ft. as the standard.[22] Ships were constructed with rails in their holds to accommodate the containers. By 1967 McLean's Sea-Land Corporation had won a contract with the US government to transport much of what the Army needed to sustain itself in Vietnam. In addition to shipping from seaport to seaport, Sea-Land assumed responsibility for moving freight to inland depots. The intermodal containers moved easily from ship to railcar or truck bed and vice versa so that Sea-Land could "track shipments, retain oversight of the containers, and ensure that the empty boxes were returned for further use."[23]

At this point, the commercial sector realized the system's advantages and began to place orders for ships built to accommodate containers. Today, oceanborne commerce amounts to 1,167.9 million metric tons, nearly double the amount 20 years earlier. Prior to the container revolution, "a typical freighter could handle only 10,000 tons" and took upwards of two weeks to unload and load cargo. Today, each 20-foot container can hold up to 20 tons of cargo, and a port such as Long Beach, California, can handle over 23,000 containers daily—roughly the equivalent of unloading and loading 45 freighters a day.[24]

Cargo hauling has locked in around the container standard with ships, trucks, railcars, cranes, and port facilities all constructed as a network to support the seamless movement of goods. Deviating from the standard will incur increased time and cost for the shipper. McLean could have endeavored simply to improve the efficiency of trucking by exploiting larger trailers and more fuel-efficient tractors, but that strategy would not have produced the exponential growth in trade that he eventually achieved by creating new standards that the entire sector adopted.

Networking for exploitation has its place. Wal-Mart has shifted from utilizing purchasing departments in its stores to computer networks that provide suppliers with real-time sales data of the products they produce. Suppliers use this data to appropriately gear their production lines to meet demand.[25] This kind of networking makes Wal-Mart more efficient. However, networking in a strategic sense to explore new concepts in a large and diverse social domain (fig. 2) seeks new combinations of emerging patterns and rule sets to produce novel solutions to enduring problems. This exploratory networking enabled Sam Walton to take advantage of emerging patterns, ultimately transforming his variety stores into a completely different type of retailer. This is why Wal-Mart has become a giant in the retail sector. Similarly, McLean sought better ways to move cargo beyond exploiting what was available in the trucking industry. By creating a network involving shipbuilders, port authorities, governmental departments, and the International Standards Committee, McLean transformed the entire shipping industry.

Recommendations

Using networks to interact with diverse groups to generate a variety of collaborative ideas that, in turn, will produce new methods for achieving national security is at least as important for the DOD as using networks to gain military advantage. Carl von Clausewitz concluded long ago that war was part of a pattern of politics. Alfred Thayer Mahan also postulated that economic competitions often led to military competition. The links among political, economic, and military systems exist and create their own more complex system. The DOD will not see patterns or be in a position to capitalize on them if it views itself as independent; that department must think of itself as an actor constituting part of a larger, continuously

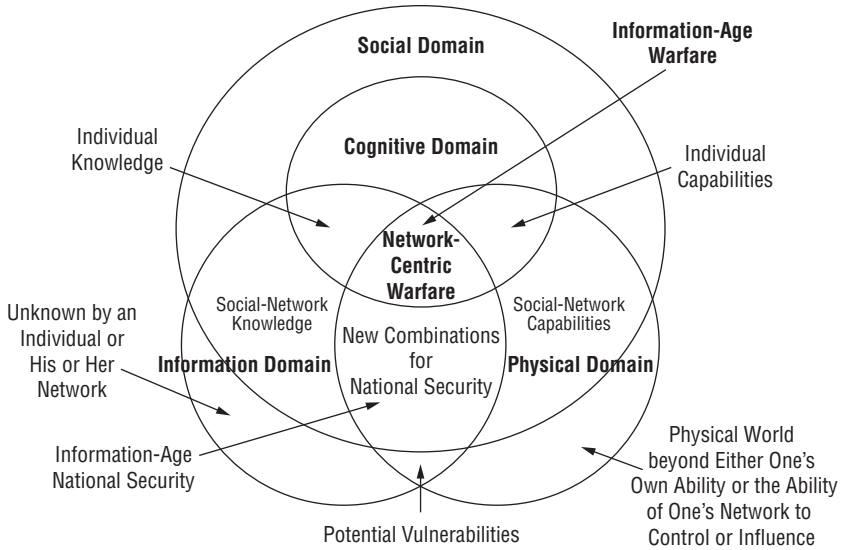

Figure 2. Information-age security. (Adapted from *The Implementation of Network-Centric Warfare* [Washington, DC: Department of Defense, Office of Force Transformation, 5 January 2005], 21, http://www.oft.osd.mil/library/library_files/document_387_NCW_Book_LowRes.pdf.)

adapting ecosystem. Thinking about the world in this way, as complex adaptive systems, comes from the modern science of complexity. As the key first step toward understanding complex adaptive systems, the DOD should incorporate complexity theory into all levels of professional military education.

The second essential step calls for DOD personnel to deliberately choose to network broadly. Familiarity gained in previous professional education will enable this initiative. Service members would understand that the purpose of networking is to define patterns and rule sets in use by other actors. It is unreasonable to expect any individual to master the broad range of disciplines that actually make up the international political and economic system. That is why policy makers and planners must have large social networks; what they cannot know, their network can (see fig. 2). By networking in political, economic, business, scientific, religious, and social systems, DOD policy makers and planners have a stronger chance of recognizing emerging patterns and appropriately posturing government departments to take advantage of them. Military leaders should encourage service members to pursue broad interaction within their neighborhoods and cities and with other government agencies as well as the private-business sector to develop diverse interests, a variety of expertise, and numerous personal contacts as a matter of course in career development. Broad, diverse networks represent a key source of the variety that leads to true innovation and breakthrough. The goal of networking this broadly, as shown in figure 2, involves moving from network-centric warfare toward networked national security.

Finally, the DOD needs to adopt various new strategies on a trial basis with the idea of modifying them to suit emerging circumstances. The past tendency has involved running long series of experiments prior to implementing new doctrines, equipment, or strategies. Real and potential enemies, however, are already working to undermine rules and paradigms that do not suit them. Terror networks use their knowledge of social networks and information-age technology to avoid engaging strong Western-

style militaries in traditional symmetrical warfare. Thus, terror networks have already mitigated some of the advantages that new systems such as the F-22 Raptor create. The point is that prolonged experimentation may simply perfect a solution to yesterday's problem and remain only marginally effective against the problems currently emerging. The context for which a new system or strategy is designed is neither fixed nor linear—it constantly changes. While terrorists successfully expand their networks, US policy makers and planners remain stagnant; consequently, potential vulnerabilities develop and grow. The DOD must not only strenuously investigate technological solutions to problems but also examine social and political structures to understand them and find nontechnical ways to manage and enhance national security.

Conclusion

The DOD has mastered traditional military conflicts and is gaining efficiencies with its current networking initiative. However, it still lacks proficiency in the larger social domain that will lead to new combinations for enhanced security. We must educate military officers to think in terms of new combinations—the journey starts in the officer-education system. Adaptation will come much faster and more regularly with constant exposure to new ideas and perspectives. Variety in ideas and perspective emerges from a large social network. The DOD must expand its networking effort to guard against becoming a highly efficient but irrelevant force for national security. ❑

Fort Leavenworth, Kansas

Notes

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Whatever Happened to Strategic Attack?

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ALL OF WAR is about will. Those who wage war follow Clausewitz's dictum: "To impose our will on the enemy is [war's] *object*. To secure that object, we must render the enemy powerless" (emphasis in original).[1] Down through history, rendering the enemy powerless most often meant denying him the means to resist by defeating his fielded military forces. There are, however, other ways of rendering an enemy powerless or otherwise convincing him to accede to one's will. Collectively called strategic attack (SA), they have a historical pedigree that long predates the name.

This article examines portions of that pedigree, reveals its length and variety, and wonders openly why one finds so little written on the subject. Always an intuitive part of the commander's tool kit, SA nonetheless has not received much explicit attention in documented US best practices. Such documentation takes the official form of joint doctrine, which mentions SA only seven times.[2] Joint Publication (JP) 3-0, *Joint Operations*, offers this short paragraph as the only explanation of SA:

> The JFC [joint force commander] should consider conducting strategic attacks, when feasible. A strategic attack is a JFC-directed offensive action against a target—whether military, political, economic, or other—that is specifically selected to achieve national or military strategic objectives. These attacks seek to weaken the adversary's ability or will to engage in conflict or continue an action and as such, could be part of a campaign, major operation, or conducted independently as directed by the President or [secretary of defense]. Additionally, these attacks may achieve strategic objectives without necessarily having to achieve operational objectives as a precondition. Suitable targets may include but are not limited to enemy strategic COGs [centers of gravity]. All components of a joint force may have capabilities to conduct strategic attacks.[3]

This is fine as far as it goes, but it does not go very far. One finds no mention of historical best practices or unique aspects of SA that may entail doctrinal consideration. Furthermore, joint doctrine does not address *how* such attacks achieve strategic objectives without achieving operational objectives as a precondition. It clearly states that a JFC "should consider" SA and just as clearly implies that it represents an effective use of "all components" of a joint force. Still, no joint doctrine exists on the subject, save this one brief mention. In contrast, one finds entire books on barriers, obstacles, and mines as well as the use of "intermodal containers" in the joint-doctrine hierarchy.[4] Doubtless, these important subjects warrant full mention in doctrine, but isn't a form of warfare that promises neutralization of enemy COGs *without* having to fight through enemy forces also worthy of doctrinal treatment?

In fairness, *Air Force* doctrine includes an entire book on SA. (In fact, a new and improved version hit the streets as of June 2007.)[5] Perhaps therein lies part of the reason that *joint* doctrine does not contain fuller treatment. But we will return to the reasons for the dearth of joint doctrine at the end of this article, after considering SA itself in greater detail.

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What It Is

Joint doctrine's definition of SA, cited above—"JFC-directed offensive action against a target . . . specifically selected to achieve national or military strategic objectives"—does not reveal much. An earlier joint definition described SA as "offensive action intended to directly affect an adversary's centers of gravity."[6] The current Air Force publication on SA defines it as "offensive action specifically selected to achieve national strategic objectives."[7] These provide little additional illumination. An older Air Force definition, produced by a general-officer-level symposium on the subject held in 2002, is perhaps the most illuminating (and certainly most specific): "offensive action conducted by command authorities aimed at generating effects that most directly achieve our national security objectives by affecting an adversary's leadership, conflict-sustaining resources, and/or strategy."[8] This puts the subject in a bit more context. To understand the matter fully, however, one must examine the specifics of that definition.

"Offensive Action"

Victory normally requires offensive action; thus, SA is the proactive and aggressive portion of strategic operations, which also include strategic defense (e.g., Cold War nuclear deterrence and the placement of Patriot missiles in Israel during Operation Desert Storm) and other strategic operations (e.g., the Berlin airlift), all of which "most directly achieve our national security objectives."

"Conducted by Command Authorities"

The joint definition gives the option of directing SA to the JFC. SA is most often conducted by components of the joint force, particularly the air and special operations components; thus, SA operations come under the purview and approval of those component commanders who support the JFC's intent. Conversely, SA often assumes such importance and sensitivity to a campaign that it receives approval directly from national leaders above the JFC, such as the president, secretary of defense, or a combatant commander. In fact, combatant commanders other than the one who appointed the JFC (such as the commanders of US Strategic Command [STRATCOM] or Special Operations Command) may sometimes have authority to conduct SA operations in the JFC's area, independent of that commander's own plan or intent—one of the reasons that we need joint doctrinal guidance on SA.

"Aimed at Generating Effects"

Defeating or coercing adversaries requires effects-based SA. That is, one must design actions against adversary systems to create specific desired effects that contribute directly to achieving military and political objectives, attainment of which delivers a set of end-state conditions that confers continuing advantage. Furthermore, one must do so while avoiding specific undesired effects that will hamper the creation of such conditions. The conduct of SA encourages taking an effects-based approach to military operations.

"Most Directly Achieve Our National Security Objectives"

The phrase *most directly* is the key to understanding this aspect of SA. Oftentimes, the accumulation of tactical actions against an enemy's fielded military forces also offers an effective way of achieving national security objectives; however, it frequently does not represent the *most direct* means in terms of level of effort or of targets selected. Such tactical victory against fielded forces often comes at a higher cost with regard to lives, treasure, time, and opportunities. So SA may prove more *efficient* as well as more direct. Ironically, historians such as B. H. Liddell Hart labeled attacks that bypass enemy forces "the indirect approach."[9] This illustrates how deeply ingrained the idea of force-on-force war has become in the military mind-set. In fact, SA is more direct, seeking to bypass the operational-level effects of traditional warfare and directly achieve strategic aims (see figure).

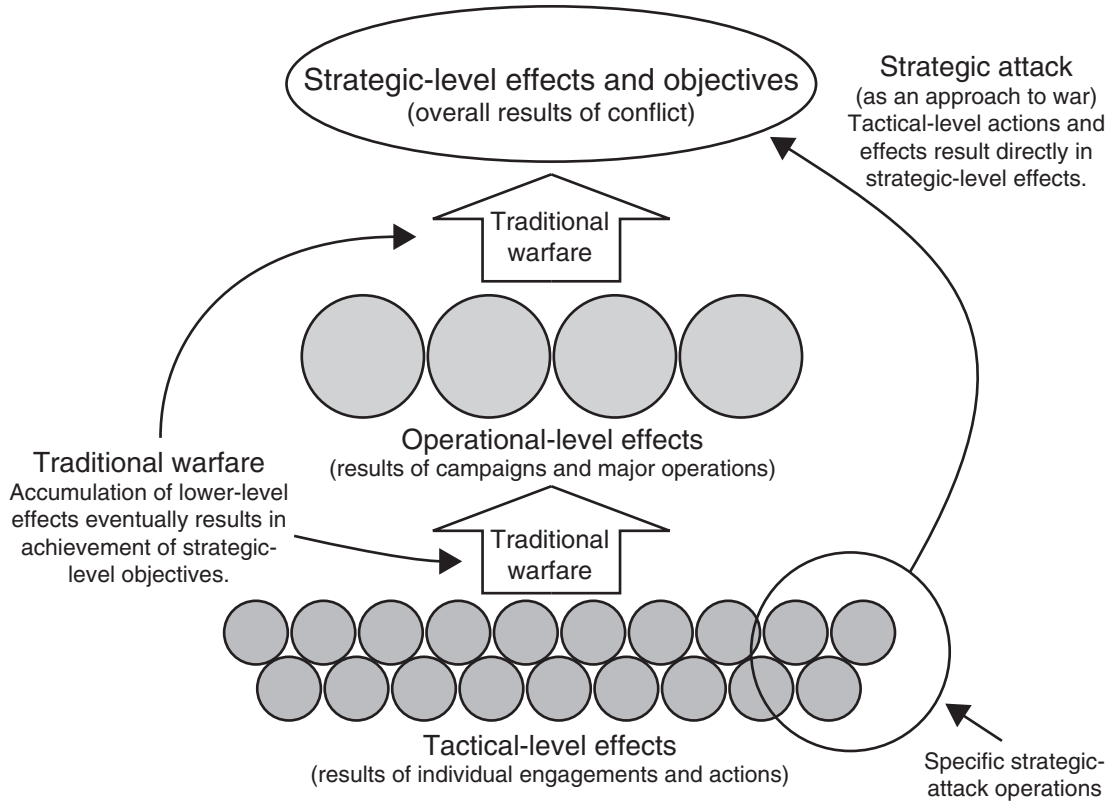

Figure. Strategic attack and the levels of war. (From Air Force Doctrine Document [AFDD] 2-1.2, *Strategic Attack*, 12 June 2007, 8, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-1-2.pdf.)

"Leadership"

Every system has some sort of directing function; every human system has a leader or leaders. In many cases, attacks that neutralize these leaders can eliminate enemy resistance, rendering the enemy powerless. Historically, as we shall see, this has most often entailed directly attacking strategic leaders; moreover, we now have the ability to attack the infrastructure that supports and connects that leadership function to the rest of the system. Of course, in today's context, one must conduct attacks on leadership in accordance with the law of armed conflict, which maintains that leaders must be legitimate military targets.

"Conflict-Sustaining Resources"

It is often possible to target an adversary's means of conducting or continuing a conflict. The support necessary to sustain resource-intensive modern warfare (even primitive war relies on resources of some sort) provides many lucrative targets, speeds the enemy's collapse, and removes options from enemy commanders.

"Strategy"

Sun Tzu said that the best policy in war is to defeat the enemy's strategy; this requires that one hold at risk what the adversary seeks to obtain or deny him the ability to obtain it. SA

can often deny an adversary strategic choices, frequently in conjunction with the denial of conflict-sustaining resources. That is, SA may deny the enemy the means of engaging in conflict or the pursuit of certain strategic choices in ways that do not involve direct destruction of his military forces.

Unique Considerations

Many considerations distinguish the conduct of SA from that of more traditional counterforce warfare. The selection of targets differs, of course, as may the means of attacking them. The sophistication required to conduct SA successfully against modern systems entails a much greater intelligence-analysis cost than do operations that simply attrit enemy fielded forces. This necessitates the development of intelligence-federation partnerships with national-level agencies and sometimes even with intelligence services of foreign governments in order to analyze systems adequately. Commanders must ensure that such preparation work happens before crises develop and conflict ensues. Further, in counterforce operations it may be possible to gauge progress simply by counting numbers of enemy troops killed or pieces of equipment destroyed, but assessing the effects of SA demands much greater sophistication in choosing measures and indicators. It also calls for more patience from commanders and national leaders since progress toward the achievement of objectives may show few outward signs until one fulfills the objectives themselves. Yet, joint doctrine mentions none of these considerations.

One Thing Strategic Attack Is Not

SA is not synonymous with *nuclear* or *atomic*, as the Cold War's long association of the word *strategic* with *nuclear* used to imply. Nonetheless, one can use nuclear weapons to conduct SA, as in the atomic bombing of Japan in 1945. In the context of SA, *strategic* refers to the level of effects—not the methods used to create them. Potentially, one can employ *any* weapon system to conduct SA, even those as simple as the spear and the sword, as historical examples show.

Historical Examples

From what source is this information on SA derived? Is there a record of historical success that demonstrates best practices? In fact, one does exist although, of course, attacks we would consider SA today were not so named by historians.

One early instance occurred at the Battle of Issus in November of 333 BC. Alexander the Great defeated the Persians when he "drove hard with his cavalry at [Persian] King Darius himself, wanting not so much to defeat the Persian army as to win the victory with his own hands."[10] Alexander drove Darius from the field and wrested his empire from him. Similarly, Charles Martel's Frankish infantry at the Battle of Tours in 732 AD isolated Emir Abd-er Rahman, the Muslim commander, and "pierced him through with many spears, so that he died, then all the [Muslim] host fled before the enemy," thus saving Western Europe from further Muslim advances.[11] The story of David versus Goliath also comes to mind. In the context of ancient battle, ground forces usually conducted SA against strategic leaders. Getting to the leader, of course, usually involved a degree of force-on-force engagement, but not the tactical defeat of the entire enemy force (as in most other ancient battles). Still, the long existence of SA proves its pedigree and the fact that surface forces can conduct it as well as any other element of the joint force. Although force-on-force engagement settled most battles, SA (when possible) proved at least an effective adjunct to attrition and annihilation, rendering military operations both more effective and efficient. Some people might consider Gen William T. Sherman's famous march to the sea and Gen Philip Sheridan's pillage of the Shenandoah Valley during the American Civil War SA *campaigns*, in that they sought to deny the Confederacy vital conflict-sustaining resources while avoiding direct engagement with Confederate forces.

Within what joint doctrine has come to call "irregular warfare," SA has also had its place.[12] From 1899 to 1902, the United States engaged in a war to suppress Philippine insurrection against American rule. Regardless of the pro-

priety of this imperialist venture, bloody and brutal on both sides, the war's most famous incident involved the capture of Philippine insurrection leader Emilio Aguinaldo by US troops in 1901. Some question exists regarding the legality of the ruse used to capture Aguinaldo according to the rules of war (US troops posed as prisoners of allied Filipino scouts, dressed in Filipino Army—not US—uniforms). Nonetheless, the action effectively ended resistance throughout most of the Philippines and represented an effective use of SA by a ground force in the context of irregular warfare.[13]

Special operations forces (SOF) often play a critical role in SA. In 1943 Norwegian and British commando teams destroyed German supplies of heavy water and sabotaged the plants used to produce them in an action dubbed by the British special operations executive "the most successful act of sabotage in all of World War II."[14] It also offered a tremendously effective example of SA designed to deny Hitler a strategy option by preventing him from creating weapons of mass destruction (WMD).

Similarly, the Allied submarine campaign against Japan in the Pacific theater during World War II showed an effective use of SA against resources: Allied submarines specifically sought to *avoid* contact with the Imperial Japanese Navy, instead going directly after commercial shipping. This campaign not only receives almost as much credit as the atomic bombing of Japan for forcing an end to the war, but also demonstrates the effective use of SA by a purely naval force. Of course, the atomic bombing, perhaps the most famous example, embodied the purest form of SA: delivery of two weapons that had direct and nearly immediate desired strategic consequences.

Airpower and Strategic Attack

After World War II, the aircraft became one of the most effective systems for conducting SA. In 1942 Lt Col Jimmy Doolittle and a small contingent of B-25 bombers operating off carriers in the central Pacific conducted an almost similarly "pure" example of SA. Avoiding Japanese air defenses, the raids caused only insignificant damage to the enemy's capabilities. Though intended primarily to bolster morale in the United States and demonstrate that Allied forces could indeed strike Japan, this action had more far-reaching strategic consequences. First, it revealed to Japan's political leadership the country's vulnerability, leading to a strategic realignment of its air forces from China to the home islands, causing, in essence, virtual attrition of the enemy's capability in China. Second, the attack convinced the Japanese general staff to pursue the course of action that led to the Battle of Midway and decisive defeat of the Imperial Japanese Navy. In this case, SA greatly facilitated operational-level campaigns concurrently under way and effectively shortened the war in the Pacific.

During the Combined Bomber Offensive in Europe in World War II, Allied air attacks against German rail and inland waterway systems struck a fatal blow against the German economy. Even though the productive capacity of individual factories increased throughout most of 1944, the disruption of transportation nearly immobilized the economy as a whole, almost stripped Germany of electrical power (due to the interruption of coal shipments), and greatly hampered the movement of the enemy's armies. These efforts might have ended the war in Europe by themselves had Germany's resistance in the field not collapsed simultaneously. "The attack on transportation was the decisive blow that completely disorganized the German economy. It reduced war production in all categories and made it difficult to move what was produced to the front. The attack also limited the tactical mobility of the German army."[15] In essence, this amounted to a fatal attack on a conflict-sustaining resource.

The SA portion of Operation Just Cause in Panama in 1989—aerial gunships destroying Panamanian dictator Manuel Noriega's *Commandancia*, for example—disrupted his command and control capabilities and helped set the context for his eventual isolation and capture by US forces. Similarly, the extensive SA portion of Desert Storm disrupted Saddam Hussein's command and control by neutralizing

many of his regime-control mechanisms, nearly leading to the downfall of his regime in the wake of the ground campaign that removed his troops from Kuwait. In Operation Allied Force, SA conducted by combined air forces coerced Serbian dictator Slobodan Milosevic into withdrawing his forces from Kosovo.

The case of Allied Force is interesting from the SA perspective for a couple of reasons. First, the true SA portion of the campaign began late, after many weeks of direct aerial attacks on Serbian fielded forces had failed. Second, the selection of SA targets was very sophisticated. Coalition strategists chose to selectively target industries and businesses associated with Milosevic's kleptocratic cronies. They combined physical attacks against these facilities with cyberspace attacks on the cronies themselves (e.g., personally addressed faxes telling them that their businesses were being bombed). Although we targeted civilian infrastructure to weaken Serbian public support for Milosevic, these nonlethal assaults caused no lasting damage (e.g., carbon-filament attacks against electrical facilities that temporarily took down much civilian power).[16] Unlike coalition counterforce action, SA did prove effective in bringing about a desirable end to this particular campaign.

This success, however, does not point the way toward what commentator Ralph Peters has called "immaculate warfare."[17] Campaigns in which nondestructive SA "wins the day" will be the rare exception, not the rule. SA is most effective in concert with other efforts, including counterforce operations. Operation Iraqi Freedom offers a better template. That campaign began with an unsuccessful but nonetheless disruptive attempt to kill Saddam outright, and SA continued throughout, disrupting leadership functions, denying conflict-sustaining resources, and neutralizing suspected Iraqi WMD sites. We used SA in much the same way in Desert Storm—or, for that matter, in World War II. Regardless of the medium from which it is conducted, SA helps the joint/combined force seize the initiative, disrupt the adversary's decision cycle and decision calculus, critically affect the adversary's strategic COGs, and otherwise establish the terms of the conflict in the manner and time of our choosing. It is a vital part of comprehensive strategy and operational design.

Our enemies certainly think so: they used one of the more spectacular examples of SA against us in the 9/11 attacks on the World Trade Center and Pentagon, even choosing to use aircraft as the means of delivery. Whether their use of SA was successful remains to be seen, but it certainly did have profound strategic consequences. For example, we use SA today in ongoing operations in the global war on terror to deny our enemies access to vital resources such as conflict-sustaining financial assets and to eliminate the enemy's legitimate combatant leadership, such as Abu Musab al-Zarqawi. The hunt for al-Qaeda and other terrorist leaders continues daily in the ongoing war (much of it carried out by elements of the joint force other than air). With boots on the ground in places like Iraq and Afghanistan, SA will once again become the province of all service and functional components of the joint force.

Joint Silence

As we have seen, SA remains distinct from other operations and has a track record of historical best (and worst) practices. It also requires that commanders consider factors sufficiently different from other operations to warrant doctrinal treatment. So why the relative silence in joint doctrine?

The answer to that question leaves many people uncomfortable. The simple explanation is that most opposition to SA in joint doctrine comes from the ground services, which see it as a threat to their perceived status as the decisive arm of the US military instrument of power. The fact that joint airpower and SOF conduct most SA today acts as an irritant since many members of the ground forces—the US Army and Marine Corps—consider those components of the joint force mere supporting elements of their decisive arms. Such a reaction is understandable to a degree: armies fight other armies, and ground-force commanders think in terms of defeating enemy forces. This situation has created a culture

rich in tradition and emotional attachment to the concept of force-on-force, attritional warfare. One finds it difficult *not* to become emotionally affected when considering the sacrifice of men (and now women) in uniform who have given their lives for America's causes during force-on-force engagements. Yet, is it possible that a prejudice exists against SA in certain joint circles *because* of the perception that it offers airpower and SOF an equal footing in the quest to be decisive? Advocates for the use of SA must take care not to overemphasize such aspects as its apparent air-centricity. All elements of the joint force can conduct SA, and all joint commanders must know how best to use forces to employ it. In today's integrated joint/combined environment, we should think in terms of defeating *the enemy*, not just his forces. Again, all war has to do with will and with compelling the enemy to do ours. SA can be a vital part of rendering the enemy powerless and creating conditions of continuing advantage.

Nonetheless, certain elements of the joint community have resisted SA in proactive and emotional terms. At one time, a draft joint publication existed—JP 3-70, "Joint Strategic Attack"—and at various times it enjoyed the sponsorship of the Air Force and STRATCOM, but elements of the joint-doctrine community fought it tooth and nail. It was cancelled at the behest of certain doctrine representatives from other services, who thought that the passing reference to SA in JP 3-0 constituted adequate treatment. The publication reemerged briefly under STRATCOM, but a joint-doctrine colloquium in 2005 voted it out of existence again. Since then, no one has tried to revive it or to craft doctrine that would well and truly represent SA's unique characteristics to a joint audience. During the document's coordination, doubts arose about the quality of the drafts submitted (SA can be difficult to write about, especially if practitioners aren't involved), but opponents maintained that we did not need it—that adequate coverage in joint doctrine already existed. This argument is false on its face. As mentioned before, we have a wealth of doctrine on such issues as mine warfare and intermodal containers (no doubt, all of it valuable) but only a paragraph on SA. Certainly, a form of war fighting that (a) commanders have used extensively in the past, (b) involves unique considerations compared to traditional force-on-force warfare, and (c) may involve potentially contentious issues of command/control and execution warrants fuller treatment in joint doctrine.

The joint-doctrine community must put aside any emotional resistance to the concept of SA and to the fiction that SA entails airpower "cowboys" trying to go it alone. The portions of the joint community that endorse SA must avoid overpromising and put aside any thoughts that it will yield "immaculate warfare," realizing that it represents only one tool in the commander's kit. Nonetheless, SA's pedigree and distinctiveness warrant granting it a permanent place in the joint-doctrine hierarchy. We need a joint-doctrine publication on strategic attack. ❑

Maxwell AFB, Alabama

Notes

1. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (New York: Alfred A. Knopf, 1993), 83.

2. Four times in Joint Publication (JP) 3-0, *Joint Operations*, 17 September 2006, and three times in JP 3-30, *Command and Control for Joint Air Operations*, 5 June 2003.

3. JP 3-0, *Joint Operations*, III-21 through III-22.

4. JP 3-15, *Barriers, Obstacles, and Mine Warfare for Joint Operations*, 26 April 2007; and JP 4-01.7, *Joint Tactics, Techniques, and Procedures for Use of Intermodal Containers in Joint Operations*, 7 January 1997.

5. Air Force Doctrine Document (AFDD) 2-1.2, *Strategic Attack*, 12 June 2007.

6. JP 3-70, "Joint Strategic Attack," third draft, March 2005, I-1 (copy at Air Force Doctrine Development and Education Center, Maxwell AFB, AL).

7. AFDD 2-1.2, *Strategic Attack*, 2.

8. AFDD 2-1.2, *Strategic Attack*, 30 September 2003, 1. The version of 12 June 2007 uses a modification of the joint definition. Though preferable in that it has some degree of "joint buy-in," the new definition is not as descriptive.

9. B. H. Liddell Hart, *Strategy*, 2d rev. ed. (London: Plume, 1991), 383.

10. Diodorus Siculus, *Library of History*, trans. C. H. Oldfather (Cambridge, MA: Harvard University Press, 1935), bk. 17, sec. 23.1-3.

11. Anonymous eighth-century Arab chronicler, quoted in Edward Creasy, *The Fifteen Decisive Battles of the World from Marathon to Waterloo* (Whitefish, MT: Kessinger Publishing, 2004), 144.

12. Irregular warfare is "a violent struggle among state and non-state actors for legitimacy and influence over the relevant population." JP 1, "Doctrine for the Armed Forces of the United States," draft final-coordination revision, 27 October 2006, I-2.

13. Max Boot, *The Savage Wars of Peace: Small Wars and the Rise of American Power* (New York: Basic Books, 2002), 99–128.

14. *Wikipedia: The Free Encyclopedia*, s.v. "Norwegian Heavy Water Sabotage," http://en.wikipedia.org/wiki/Norwegian_heavy_water_sabotage.

15. *The United States Strategic Bombing Surveys (European War) (Pacific War)* (1945; repr., Maxwell AFB, AL: Air University Press, 1987), 30.

16. See, for example, "CBU-94 'Blackout Bomb,' BLU-114/B 'Soft Bomb,'" *Federation of American Scientists Military Analysis Network*, 7 May 1999, http://www.fas.org/man/dod-101/sys/dumb/blu-114.htm.

17. Ralph Peters, "The Myth of Immaculate Warfare," *USA Today*, 5 September 2006, http://www.usatoday.com/news/opinion/editorials/2006-09-05-warfare-edit_x.htm.

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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.*

The Need for Developmental Planning

Mr. Gregory K. Jenkins
Lt Col Christopher A. Lettiere, USAFR*

IN TODAY'S RAPIDLY evolving technology environment, new war-fighting capabilities often seem to emerge virtually overnight. Quick reaction capability (QRC) programs such as the massive ordnance air burst (MOAB) have generated substantial headlines, which would lead one to believe that only the briefest of planning horizons is necessary for the development of modern armament. However QRC programs are generally the tip of the iceberg, representing only the culminating step in a series of development efforts. As our war-fighting systems become increasingly complex and interconnected, the extensive effort required to "birth" a new capability continues to mandate a deliberate and systemic developmental-planning process.

Air-Armament Developmental Planning

Nearly four decades ago, the Air Development and Test Center at Eglin AFB, Florida, established the Developmental Planning Directorate (XR). Prior to the founding of this organization, developmental-planning efforts within the air-armament acquisition process were largely ad hoc and disjointed. XR was chartered with instituting and maintaining a disciplined process for defining and selecting new weapon-systems concepts for further development to satisfy the Air Force's operational needs. Much of this process focused on the preparation of planning documents and justification for new armament systems based upon direct-analysis support to the weapon-systems development programs. However, the most challenging aspects involved the "matchmaking" process between requirements pull (such as the need to counter modern threats, the evolution of societal standards requiring minimization of collateral damage, and new concepts of warfare redefining close air support), technology push (such as advances in signal-processing technology, availability of the global positioning system [GPS], and miniaturization of modern electronic components), and the inevitable limitations of development funding. As the developmental-planning process for air-armament systems matured, XR's scope of effort increased notably, spawning such successful major programs as the advanced medium-range air-to-air missile, combined-effects munition, and sensor-fuzed weapon.

Although the years brought about many changes in the designation of both the armament-acquisition activity at Eglin and the

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developmental-planning function therein (fig. 1), the basic function of defining and selecting new weapon-systems concepts for further development has remained at the core of armament developmental planning.

A Case Study of Technology Transition into a Major Acquisition Program

One needs some historical perspective to appreciate the requirement for the often costly and time-consuming developmental-planning process, made evident by reviewing the development of an armament technology now taken for granted—autonomously guided air-to-ground munitions. In late 1984, Armament Division XR commissioned a study to demonstrate the utility of an inertial-aided munition for all-weather attack. This study was founded on the emerging technology opportunities provided by advances in inertial-navigation components and the common-reference grid provided by the GPS program. Target-based requirements for airfield-attack missions appeared well suited for this technology. Therefore the analysis was based upon attack of a representative Warsaw Pact airfield with more than 50 separate targets of interest (fig. 2).

The operational concept under study entailed using high-altitude aircraft to deliver large payloads in an accurate manner from standoff ranges as opposed to dive-bombing or the use of laser-guided bombs (LGB), neither of which represented all-weather capabilities (fig. 3). The vision called for striking all of the important aim points, using fewer bombs than a single bomber could carry, while improving aircraft survivability by avoiding successive attacks on individual aim points and direct overflight of the target.

As a result of the study, Air Force Systems Command's Planning Directorate decided to spend its own discretionary funds on the proposed inertial-guided technology demonstration (IGTD). This proof-of-concept demonstration mated low-cost inertial-guidance kits with standard bombs and dispensers to create a system capable of guiding these "dumb" warheads to selected targets. The program commenced in December 1986 with dual contract awards to Boeing and Northrop to build and demonstrate conversion kits.

The kits used for this program had only inertial guidance since initial GPS-user equipment sets were far too large and expensive to employ within munitions. However, the GPS provided a common reference grid utilized to transfer navigation-alignment parameters from the appropriately equipped launch aircraft, initializing the inertial-guidance system within munitions. At the commencement of the IGTD program, GPS technology was so immature that we had no satellites in orbit, and initial testing had to take place at Yuma Proving Grounds using an "inverted" GPS-guided weapon-testing range with stationary pseudosatellites positioned on the ground. Later in the IGTD program, a minimal set of satellites became available to support testing. However, the simultaneous development of IGTD technology and the GPS satellite constellation often put the two at

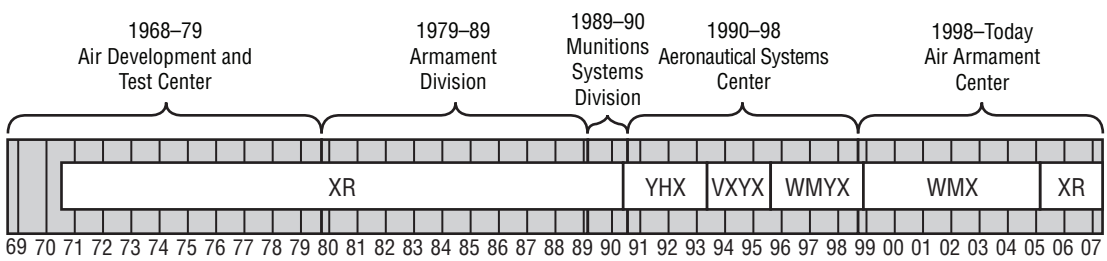

Figure 1. Organizational designations for air-armament developmental planning

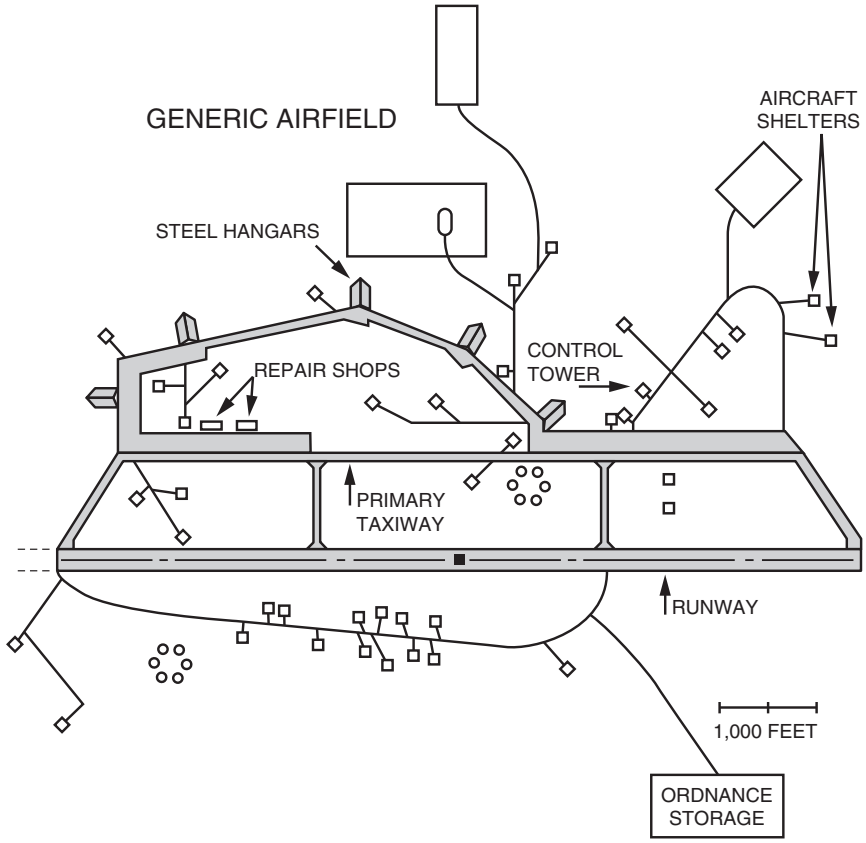

Figure 2. Representative Warsaw Pact airfield

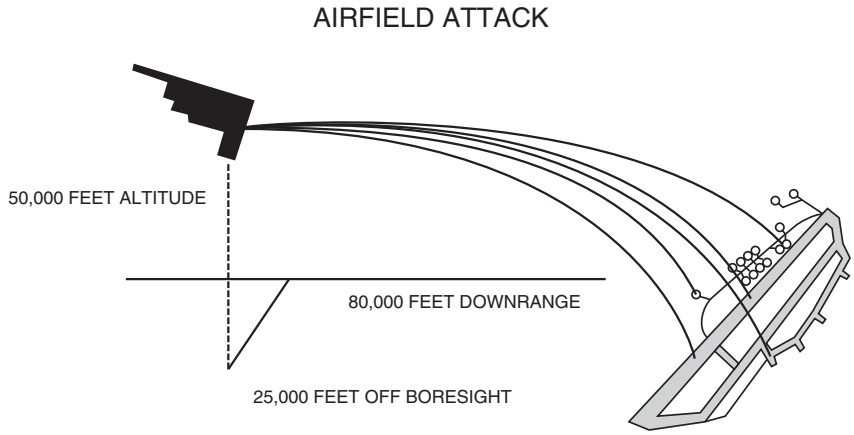

Figure 3. Operational concept for airfield attack

odds, as demonstrated when controllers of the GPS satellite constellation modified that constellation at the same time an IGTD flight test occurred, causing all munitions to miss their planned targets. However, even this test helped prove the efficacy of the technology since the average miss distance of a weapon precisely matched the magnitude of the GPS-constellation grid correction!

The IGTD program ended successfully, proving the feasibility of transferring alignment from the host aircraft to the weapon, of consistently dropping autonomously guided weapons with the specified accuracy, and of producing the resultant system at an acceptable price. However, due to continued reliance on maturer technologies, such as LGBs, the war fighters declined to establish a need statement for the new technology.

During Operation Desert Storm, coalition aircraft used LGBs with great effectiveness, but operational limitations made clear the need for an all-weather air-to-surface munition. As a result, in 1992 the Joint Requirements Oversight Council validated the requirement for such a capability, resulting in the initiation of the all-weather precision-guided munition (AWPGM) program, which moved guidance technology for autonomous weapons out of the developmental-planning venue and into the acquisition mainstream. The AWPGM effort eventually led to the highly successful Joint Direct Attack Munition (JDAM) program. Finally, in October 2003, a B-2 bomber dropped 80 JDAM GBU-38 bombs, demonstrating the envisioned capability set forth in the XR utility study 17 years earlier.

The Need for Armament Developmental Planning

The evolution of the JDAM program from developmental-planning efforts in the early 1980s to fruition nearly two decades later is not a unique case of technology transition. Historical records indicate that the current generation of autonomous area-denial systems likely stems from the "Wasp" study conducted by XR in 1978 as a component of the Wide Area Anti-Armor Guided Munition program.[1] Similarly, one can trace current development efforts for directed energy (DE) weapons back to XR's Battlefield Laser Implications Project of 1982 and can trace the Universal Armament Interface back to the Stores Integration Program of 1983.[2] Despite the clear link between a robust developmental-planning function and the later achievements of the greater acquisition community, emphasis on developmental planning continues to vary cyclically, as one can see in figure 4, which depicts the varying manpower levels devoted to this function.

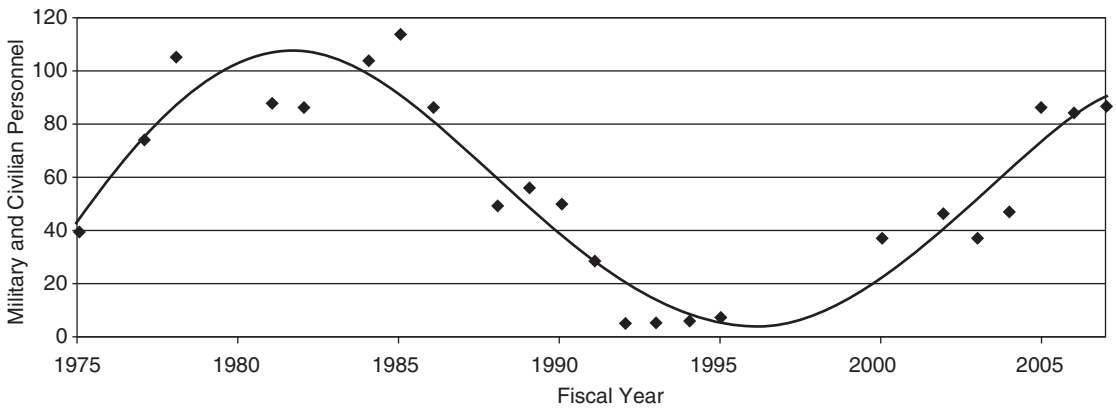

Figure 4. Manpower for armament developmental planning

The late 1970s and early 1980s saw tremendous emphasis on developmental planning as a component of the armament-acquisition process. As a result, a plethora of advanced weapon technologies emerged in the 1990s, including the JDAM, Joint Air-to-Surface Standoff Missile, and Wind-Corrected Munition Dispenser. However, the diversion of manpower necessary to execute these highly successful programs had the effect of reducing the developmental-planning staff to a caretaking cadre in the early 1990s. Consequently, in the early twenty-first century, the only major new-start armament-acquisition program has been the Small-Diameter Bomb.

The Future of Air-Armament Developmental Planning

Continued emphasis on air-armament developmental planning is absolutely necessary in order to support the force planned for upcoming decades. The manner in which the emergence of DE weapons closely parallels historical armament-developmental efforts exemplifies this need.

As discussed in the previous case study, the development of autonomously guided weapons continued for years without instigating a weapon-acquisition program, largely due to the lack of a unique link between new capabilities and existing requirements, along with reliance upon maturer, more familiar technologies. Only when the experiences of Desert Storm provided a catalyzing function to meld technology push with war-fighter pull was the JDAM program finally born. Analogously, DE concepts have been in development for decades without fielding a substantial air-to-ground weapon. We have conducted DE development efforts without direct linkage to current war-fighter requirements and have focused ongoing weapon-acquisition efforts, designed to meet war-fighter requirements, on more conventional and familiar technologies. However, the ongoing experiences of Operations Enduring Freedom and Iraqi Freedom have highlighted the limitations of traditional kinetically based armament in urban operations, emphasizing the need for a class of weapons with greater precision and less likelihood of causing collateral damage.

War fighters are unlikely to generate new and unique requirements to specifically leverage the capabilities of DE weapons. Rather, we will evaluate those weapons against other weapon options to determine the optimal solution for meeting existing requirements such as high precision, extremely short "time of flight," scalable effects, and reduced collateral damage. This will require a significant paradigm shift in order to consider this new class of weapons within the context of centuries-old concepts for employing kinetic weapons. We will need an integrating function between scientists and war fighters in order to bridge this chasm. The requirement for this integrating function shows the need for armament developmental planning. ❑

Notes

1. Voncille Jones and Barry R. Barlow, *History of the Air Development and Test Center, 1 October 1977–30 September 1978* (Eglin AFB, FL: Air Development and Test Center, 1978), 1:28. (For Official Use Only) Information extracted is not FOUO.

2. Voncille Jones and Barry R. Barlow, *History of the Armament Division, 1 October 1981–30 September 1982* (Eglin AFB, FL: Armament Division, 1982), 1:46, 26. (FOUO) Information extracted is not FOUO.

Excellence in Leadership

Lessons Learned from Top-Performing Units

Mr. Martin Pitt
Dr. Michael Bunamo*

IN 2004 I became the new executive assistant for leadership in the US Air Force Office of Special Investigations (OSI). Because of my responsibility for training OSI personnel assigned to leadership positions, I had a particular interest in learning how the command's award-winning leaders influenced their personnel to fulfill the mission. One day I asked my colleague and coauthor Dr. Bunamo if a fact-based way existed to identify the leadership and management practices used in the command to foster performance excellence. After mulling over this question, he recommended an approach consistent with Air Force doctrine, pointing to two passages from Air Force Doctrine Document (AFDD) 1-1, *Leadership and Force Development*:

> Effective leadership transforms human potential into effective performance in the present and prepares capable leaders for the future. . . .
>
> The primary task of a military organization is to perform its mission. The leader's primary responsibility is to motivate and direct people to carry out the unit's mission successfully. A leader must never forget the importance of the personnel themselves to that mission.[1]

He suggested that we reverse-engineer performance excellence to identify effective leadership. Dr. Bunamo wanted to harness the OSI's data-mining capabilities to identify top-performing units and validate these selections with OSI senior leaders. Then he proposed that we interview unit leaders to learn how they fostered performance excellence, hastening to add that this was a risky procedure without a guarantee of success. That said, I sought and received backing from Brig Gen L. Eric Patterson, then the commander of the OSI, for the Excellence in Leadership project. This sequence of events led us on a remarkable journey that has provided some amazing results.[2]

Background

To identify excellent units, we used some high-tech wizardry. We defined an excellent detachment as one that demonstrated the following:

- High productivity, as measured by the unit's ability to provide more output per hour than its peers. In the OSI, output includes investigations, intelligence-information reports, counterintelligence briefings, and specialized investigative services.
- Mission versatility, as demonstrated by above-average performance in a variety of mission areas, especially under challenging circumstances such as deployments.
- Efficiency, as measured by a unit's ability to complete mission-related tasks on a timely basis against established metrics. In the OSI, efficiency metrics track the timely completion of felony investigations and the rapid dissemination of threat information.
- Results orientation or the unit's mission effectiveness, as measured by the results of its efforts, such as the percentage of convictions in criminal investigations, the number of recoveries in fraud cases, or

*Mr. Pitt, of the Air Force Office of Special Investigations (OSI), Andrews AFB, Maryland, is adviser to the command on leadership development, and Dr. Bunamo, now retired, served as a command contract analyst with the OSI.

the responsiveness of counterintelligence collections to the Department of Defense's highest-priority collection requirements.[3]

We used data-mining software and statistical algorithms to examine performance data on 150 OSI field detachments around the world during 2001–4. We extracted all of the data from the command's legacy and current information-management systems. After examining the indicators, we selected seven units for in-depth study.[4]

Capitalizing on the OSI's traditional law-enforcement skills, we found that structured interviews helped us identify effective leadership practices employed in these units.[5] In each interview, we asked the same questions about leadership practices and management processes used to foster excellence in performance in garrison units during peacetime. We collected information from unit commanders (both military on active duty and civilian personnel), their superintendents or the senior noncommissioned officer at the location, and the agents and support personnel who were members of these units, asking them about what encouraged performance excellence. We hoped to determine if these leaders used common policies and practices to foster excellence.

What Made These Leaders Different

During these sessions, we were struck by how the interviewees differed from stereotypical views of excellent leaders. For example, we found that having a reputation as the world's nicest person did not necessarily reflect excellence. Neither did stern, authoritarian taskmasters necessarily foster that quality.

The participants made up a diverse group. We interviewed men and women, active duty military and civilians, none of whom had a single behavioral style in common. Some were soft spoken—others more forceful.[6] Leadership experience also varied; some had four or more leadership assignments—others only one or two.

Although dissimilar, they possessed similar leadership skill sets. The interviewees tended to view leadership as a process rather than a position, focusing their energy on creating an environment in which others could succeed. These individuals also proved effective in achieving mission objectives while sustaining productive working relationships in the unit.

They recognized the propriety of serving as a boss, realizing that forceful leadership does not have to equate with obnoxiousness. During the interviews, we found that these leaders felt comfortable with themselves, with command, and with dealing with individuals both personally and professionally.[7] They brought a different mind-set to their jobs, telling us that they believed in service before self and demonstrating that belief in three ways: by ensuring that their customers received timely, first-class products and services; by providing their units the resources and training required to get the job done; and by demonstrating compassion for employees and their families.[8]

Best Practices during Peacetime

Our interviewees took small-unit leadership seriously, starting when they learned about the assignment. They prepared diligently for their new command by learning about the unit and its mission, the accompanying challenges, and the personnel they would lead.[9] Once in command, they defined roles and responsibilities for all unit members and took a hands-on approach to fulfilling the mission. Most of them self-inspected key programs, using the OSI inspector general's checklist, and spent the time required to bring all programs into compliance with established standards.[10] They monitored and measured performance, holding people accountable for the results of their efforts. They rewarded and punished as appropriate, but they did not micromanage, relying instead on coaching and mentoring to help unit members succeed and grow.

These leaders had a vision for where they wanted their teams to go—a vision founded on the priorities and requirements of key cus-

tomers but also reflecting internal goals developed collaboratively.[11] They realized that vision by developing detailed plans that guided execution, expecting everyone to contribute to the plan to make it a success. They worked hard to develop a sense of inclusiveness.

These leaders got results by working through others. They made every effort to build trust with their personnel by emphasizing a positive attitude, fairness, and honesty, as well as by creating a sense of "one team, one fight." The teams knew what their superiors expected of them. Leaders challenged their unit members and stretched them. Brainstorming tough issues as a team, they encouraged thinking "outside the box" and displayed a willingness to learn from their personnel. Exhibiting respect and appreciation for all, they created a thoroughly professional workplace. These leaders provided "top cover," which enabled team members to focus on mission-related tasks.

These attributes became particularly evident as we observed how they worked with probationary agents—any OSI agent with less than one year on the job. The leaders viewed probationary agents as a gift whose energy and enthusiasm could propel a unit to excellence. Recognizing that inexperienced agents made mistakes, they compensated by creating a learning environment through continuous coaching, mentoring, and training, explaining to their personnel what to do and then showing them how to do it. They worked with different people differently—doing more for some and less for others. When mistakes occurred, these leaders took corrective action without belittling the people involved and then moved on to meet the next challenge.[12]

Excellent communicators, they maintained an open-door policy and "managed by walking around."[13] They provided honest feedback and listened.[14] They were helpful, respectful, encouraging, and enthusiastic. In this way, these leaders communicated to members of the unit that they considered them important and that they cared about them. In turn, their subordinates often described them as authentic, down-to-earth, empathetic, honest, and trustworthy.[15]

Decisive and determined, these leaders worked hard and made up their own minds. They did the right things. They held themselves accountable. No one questioned their integrity. They had an unwavering commitment to achieving excellence—to being the best.

Changes during Wartime

As the pace of deployment of OSI personnel in support of operations in Afghanistan and Iraq increased, internal debate intensified about whether or not leadership policies and practices would or should change in wartime. With the backing of Brig Gen Dana Simmons, the current OSI commander, we expanded the scope of the project and interviewed individuals identified by OSI senior leaders as having excelled in a wartime environment.

All of the people we interviewed described leading in wartime as the most important assignment of their career.[16] Most of them indicated that key leadership practices which fostered performance excellence in peacetime carried through to a war zone. OSI combat leaders told us that they

- prepared thoroughly for their assignments;[17]
- learned their environment well, especially the requirements of combatant commanders;
- built well-functioning teams through collaboration and open communications;[18]
- created people-friendly environments;
- had a vision of where they wanted the unit to go and vetted it with unit members;
- crafted detailed operational plans to guide mission execution, ensuring that all personnel involved in an operation knew their role and what leaders expected of them; and
- avoided micromanaging.

They also told us that wartime assignments differed in significant ways, citing as an example the importance of new leaders getting off to a

fast start. Having only four or five days to bond with the unit, new commanders had to show their commitment to the mission. They needed to invest time with the members of the unit, work the same hours as everyone else, and share the same experiences and stresses. Moreover, unit leaders had to prepare themselves for the fact that everything happens faster in combat. Our interviewees had written their letter on command philosophy and expectations in advance so they could publish and discuss it with unit members as soon as they assumed command. They had also mapped out the essentials of a plan for leading their unit in the battlespace but made adjustments after meeting with their personnel.

A war zone's accelerated pace reflected two hard facts: unit leaders started at a pronounced disadvantage by fighting a ruthless and capable enemy in his "house" and, in the case of OSI units, by fighting with team members who had not worked or trained together. To offset these disadvantages, OSI leaders must

- become part of the joint team in-theater;
- hone their knowledge, skills, and tradecraft to a fine edge;
- lead courageously and by example;
- become less tolerant of mistakes;
- confront problems quickly;
- learn to weigh risks against the benefits of different courses of action;
- work and train continuously to improve mission execution;
- be prepared to adapt and improvise;
- exercise self-confidence and decisiveness; and
- remain alert to signs of stress in the unit.

According to the people we interviewed, in a war zone they had to act like commanders around the clock and let their actions speak for themselves because Airmen will follow what their leaders do—not necessarily what they say. Leaders have to direct both themselves and unit members through difficult situations because there may not be specialists to turn to for assistance. Leaders also must find ways to relieve stress and tension. Finally, all of the interviewees acknowledged that leaders should realize that the wartime experience would change them, especially upon their return home.

Conclusion

We found that excellent wartime leaders had several personal traits in common. They could focus themselves, would never quit, and responded creatively to challenge and adversity. All of them took extremely seriously their responsibility to bring their colleagues home safely.[19]

The Excellence in Leadership project provided a bountiful harvest of lessons learned, practical leadership suggestions, and helpful hints. We have made these results available to all OSI leaders by uploading the study on the command's intranet. The study has now become part of the curriculum of the Leadership Challenge Forum (LCF), a workshop in unit-level leadership principles provided in conjunction with professional military education. The LCF is designed for newly assigned active duty and Reserve commanders, special agents-in-charge, and superintendents—especially those taking their first leadership assignment. Staff lectures and presentations by senior OSI leaders emphasize essential leadership and management skills required for the operation of an OSI unit, while practical exercises prepare students for their new roles.

During the LCF, we demonstrated a direct link between unit leadership and mission effectiveness. Although all Air Force managers share the same goal of successfully accomplishing the mission, only individuals with an unwavering commitment to leadership bring out the best in unit personnel. The results of the Excellence in Leadership study indicate that those who set high standards, as well as motivate and inspire Airmen, can foster performance excellence consistently. These empirical findings underscore and reinforce the very same points from AFDD 1-1 that we discussed in this article's introduction. ❑

Notes

1. Air Force Doctrine Document (AFDD) 1-1, *Leadership and Force Development*, 18 February 2006 (interim change to the version of 18 February 2004), 1, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd1-1.pdf.

2. See Michael Bunamo and Martin Pitt, *Excellence in Leadership*, vol. 1, *Peacetime*, vol. 2, *Wartime* (Washington, DC: US Air Force Office of Special Investigations, 2006).

3. Law-enforcement agencies measure performance in many different ways. The Municipal Research and Services Center of Washington, a nonprofit organization that works to foster excellence in local government, maintains an excellent Web site that illustrates the use of metrics by law-enforcement agencies. See http://www.mrsc.org/subjects/pubsafe/le/le-main.aspx. See also *Use of Data in Police Departments: A Survey of Police Chiefs and Data Analysts* (Washington, DC: Justice Research and Statistics Association, 2005), 12–26.

4. Upon request, we will make available a short paper that describes the criteria and methods used in selecting excellent units.

5. Dr. Mike Thirtle, "Developing Aerospace Leaders for the Twenty-first Century: A Historical Context for the DAL Concept," *Air and Space Power Journal* 15, no. 2 (Summer 2001): 52–57, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/sum01/thirtle.pdf. This article contends that the Air Force was lax in documenting its own excellent leadership practices in a comprehensible, universally articulated way.

6. Drea Zigarmi et al., *The Leader Within: Learning Enough about Yourself to Lead Others* (Upper Saddle River, NJ: Prentice Hall, 2005), 211–44. Chapter 7 examines the relationship between personality and leader behavior.

7. Oren Harari, *The Leadership Secrets of Colin Powell* (New York: McGraw-Hill, 2002), 125–40. Chapter 8 emphasizes the importance of people.

8. Larry Bossidy and Ram Charan, *Execution: The Discipline of Getting Things Done* (New York: Crown Business Press, 2002), 1–9. The introduction discusses the necessity of getting things done.

9. Michael Watkins, *The First 90 Days: Critical Success Strategies for New Leaders at All Levels* (Boston: Harvard Business School Press, 2003), 1–15. The introduction discusses why transitions are critical times for newly assigned leaders.

10. Maj Gen Perry M. Smith, *Rules and Tools for Leaders: A Down-to-Earth Guide to Effective Managing* (New York: Perigee Books, 2002), 45–52. Chapter 3 discusses setting standards.

11. Ibid., 53–68.

12. Daniel Goleman, Richard E. Boyatzis, and Annie McKee, *Primal Leadership: Realizing the Power of Emotional Intelligence* (Boston: Harvard Business School Press, 2002), 53–69. Chapter 4 discusses gearing one's leadership style to the situation.

13. Gen Hal M. Hornburg stresses the importance of communications in "What I Believe," *Air and Space Power Journal* 19, no. 1 (Spring 2005): 4–16, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj05/spr05/spr05.pdf.

14. Jack Welch with Suzy Welch, *Winning* (New York: HarperBusiness Press, 2005), 25–51. Chapters 2 and 3 discuss the importance of honest feedback.

15. Robert Galford and Anne Seibold Drapeau, *The Trusted Leader: Bringing Out the Best in Your People and Your Company* (New York: Free Press, 2002), 29–41. See chapter 3 for a discussion of the characteristics and competencies of trusted leaders.

16. Bunamo and Pitt, *Excellence in Leadership*, vol. 2, *Wartime*, 7–17.

17. John Keegan, *Intelligence in War: Knowledge of the Enemy from Napoleon to al-Qaeda* (New York: Alfred A. Knopf, 2003), 7–25. Chapter 1 discusses preparing for a wartime command.

18. Edgar F. Puryear Jr., *American Generalship: Character Is Everything: The Art of Command* (Novato, CA: Presidio Press, 2000), 188–235. Chapter 6 discusses how contact with the troops influenced General Eisenhower's decision making.

19. Col Thomas A. Kolditz, "The *In Extremis* Leader," *Leader to Leader*, no. 36 (Spring 2005, supplement): 6–18, http://www.leadertoleader.org/knowledgecenter/L2L/spring2005-supp/kolditz.html. This article describes the characteristics of individuals leading in dangerous and high-risk situations.

At the very heart of warfare lies doctrine. It represents the central beliefs for waging war in order to achieve victory.

—Gen Curtis LeMay, Chief of Staff, US Air Force, 1961–65

Exposing the Information Domain Myth

A New Concept for Air Force and Information Operations Doctrine

Maj Geoffrey F. Weiss, USAF

Editorial Abstract: Within all military services, information remains mischaracterized as a "domain," and all services have difficulty quantifying and establishing doctrine to exploit the war-fighting advantages of information. At least within the US Air Force, the author asserts that a poor doctrinal structure and inadequate definitions of information operations contribute to the problem. He proposes a completely new doctrinal framework, along with recognition of cyberspace as the true domain, in order to begin solving these challenges.

The difficulty lies, not in the new ideas, but in escaping the old ones, which ramify, for those brought up as most of us have been, into every corner of our minds.

—John Maynard Keynes

ON 11 SEPTEMBER 2001 (9/11), a small group of terrorists brought the most powerful nation on the earth to its knees and paralyzed much of the world. The US economy plunged into recession, the airline industry collapsed, and "soccer moms" rushed out to buy gas masks. The essence of this quintessential, asymmetric assault was not the use of aircraft as weapons or the horrific but nonetheless militarily insignificant results. Indeed, this was information warfare of the highest order. Years of planning, analysis of enemy psychology, assessment of physical vulnerabilities, training, operational security, and brutally efficient execution characterized this psychological operation. The terrorists did not seek to seize territory or defeat the US military; rather, they intended that 9/11 send messages to multiple audiences: to sympathizers ("We are powerful, join us"); to the United States ("We can hurt you; remove your troops from our soil and change your policies"); and to the world ("Interfere with our agenda at your own peril, for you will be next"). As in ages past, information operations (IO) use messages as weapons, and the enemy currently has the advantage.[1]

Using weapons is fundamental to the military. Even before 9/11, the US military had begun the process of understanding and harnessing the products of the information revolution taking place throughout the world—a revolution fueled primarily by the advent of the microcomputer and improvements in data-transmission technologies. Whereas in the past, military forces sought to control lines of communication on the physical battlefield—highways, sea-lanes, airfields, and railroads—at present, information itself is the lifeblood of technologically based forces, and its lines of communication often flow through a domain known as cyberspace.[2] But not all aspects of IO are technically based; neither are they new to warfare. The martial use of psychological influence has existed since the first caveman frightened his enemy with a howl or distracted him with a tossed rock. Millennia ago, Sun Tzu famously proclaimed that all warfare is based upon deception.[3] However, the recent explosion of information technology has piqued our interest in IO. Information has become a valuable resource, a commodity, and a military necessity. Defense and exploitation of this resource has compelled military and civilian leaders alike to act quickly to establish an IO doctrinal framework.

The US Air Force (USAF), as perhaps the most technologically centered branch of the armed services—having itself arisen from the achievement of controlled, powered flight—has relied upon the continuous advancement of scientific and technological innovation to remain the overwhelmingly effective fighting force it is today. Even so, rapid advances in information technology and its implications for warfare have obligated the USAF, like the rest of the military, to speed efforts to define and refine its own IO doctrine—to "weaponize" information. This has presented a challenge to doctrine writers as the USAF attempts to establish an effects-based approach to IO that is in concert with air and space power. Clearly the service must have doctrine that is well defined, expansive enough to accommodate the swiftness of change, and sufficiently flexible to assimilate future concepts and capabilities while still adequately treating timeless, nontechnical principles such as psychological operations (PSYOP) and military deception (MILDEC). Current USAF doctrine, for IO in particular, has not met this challenge, partly due to the fact that a necessary and proper delay occurs between analysis of theory/lessons learned and the codification of doctrine—but also because we have not adequately adapted the current *structure* of the doctrine. Furthermore, shortcomings exist in the definition of IO—arising from a mischaracterization of information itself—that have led to difficulty in understanding and employing IO at all levels of war.

An examination of the vast body of writings on the subject of IO reveals near-universal agreement on two points. First, IO is an extremely significant aspect of national security and, by extension, military operations: we must use it to our advantage. Second, the United States cannot seem to get IO right, whether in doctrine, training, definition, employment, leadership, or some combination of these. The IO cognoscenti have prescribed

a formidable array of procedural remedies or exhortations to "just do it," but these have treated only symptoms—not the root problem. None have recommended a fundamental shift in definitions, characterization, and doctrinal architecture. Often the solution to an intractable problem requires a return to first principles, an examination and reformulation of basic beliefs, a system "reboot." To make IO the weapon it needs to be, the USAF must lead the way and establish IO doctrine built correctly from the ground up.

Basics of Doctrine

Doctrine can arise from theory, lessons learned, or a study of exercises and experiments. Good doctrine is designed to be understandable and useful in the real world, at the level of warfare for which it is written. Doctrine can prove especially critical in areas that may be least intuitive: IO, for example. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, defines air and space doctrine as "a statement of officially sanctioned beliefs, warfighting principles, and terminology that describes and guides the proper use of air and space forces in military operations."[4] Because doctrine influences the way the USAF organizes, trains, equips, and sustains its forces, it represents a significant factor not only in the way the service fights but also in terms of the requirements, planning, programming, and budgeting process.

The USAF writes basic, operational, and tactical doctrine. The principles of basic doctrine, which reflect the service's most fundamental and enduring beliefs or "elemental properties," rarely change. Operational doctrine, which "describes more detailed organization of air and space forces and applies the principles of basic doctrine to military actions," changes infrequently as well, but more often than basic doctrine since we derive insight from new technologies or lessons learned.[5] AFDD 2-3, *Irregular Warfare*, serves as an example. By contrast, tactical doctrine entails frequent updates with routine innovation in tactics, techniques, and procedures. AFDD 1 plainly and properly states that "it must be emphasized that doctrine development is never complete."[6] Because its users own Air Force doctrine, each Airman must know it, look after it, and help fix it when required. Currently, the USAF publishes basic and operational doctrine in a series of documents arranged hierarchically and organized according to logical functional areas. This doctrinal structure embodies the architectural framework within which doctrine lives, changes, and grows (fig. 1).

The USAF arranges doctrine in a classification hierarchy to facilitate its understanding and use, organizing doctrinal categories from general to specific in a series grouped according to function and similarity. Subcategories, though stemming from the same parent category, reflect fundamental differences that distinguish them from each other. For example, AFDD 2-1.1, *Counterair Operations*, and AFDD 2-1.4, *Countersea Operations*—both encompassed by AFDD 2-1, *Air Warfare*—differ in terms of target type. To maintain clarity, all doctrine must be logical and adhere to these basic principles.

In general, this logically arranged USAF doctrine contains an impressive, time-tested body of wisdom and practical guidance. USAF operational doctrine extends from basic doctrine and begins with the parent category (AFDD 2, *Operations and Organization*). Within AFDD 2 one finds the fundamental, "domain," or core volumes of Air Force operations doctrine: AFDD 2-1, *Air Warfare*; AFDD 2-2, *Space Operations*; and AFDD 2-5, *Information Operations*. Although USAF "living" doctrine has expanded over the years, no significant change has occurred in the overall structure of the doctrine itself—a situation that presents problems when the USAF attempts to "fit" IO and the emerging domain of cyberspace into its body of doctrine.

Origins of Information Operations Doctrine

If we are to accept air forces as a military weapon, our first inclination is to fit it into the established theories and practices of war-

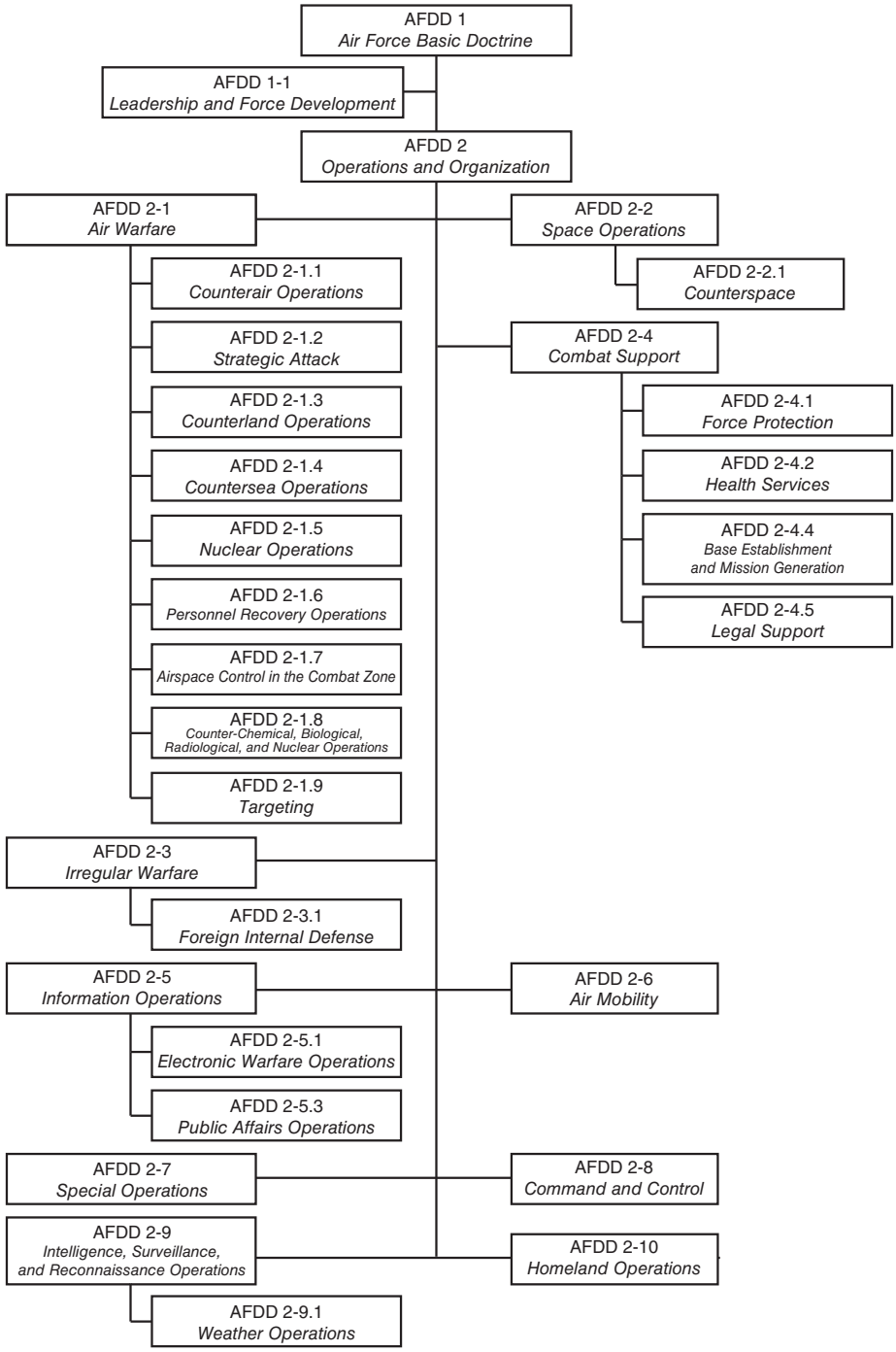

Figure 1. Air Force doctrine today. (From "Doctrine Hierarchy," Air Force Doctrine Center, https://www.doctrine.af.mil/Main.asp? [accessed 5 December 2007].)

fare, with as little disruption as possible. Certainly this takes the least mental effort, and is therefore most inviting. But such an application is not necessarily most efficient.

—Air Corps Tactical School, 1935

This epigraph illustrates how airpower itself suffered from the general tendency to force new concepts into old, familiar paradigms. Substitution of the word *information* for *air forces* yields much the same condition that exists today with respect to IO. This irony was not apparent to the USAF as it embarked on the task of codifying information-warfare lessons and principles into doctrine shortly after the first Gulf War. In 1995 the chief of staff and secretary of the Air Force released *Cornerstones of Information Warfare*, the service's first official publication on the subject.[7] (Since then, the term *information operations* has replaced *information warfare*.) Though not doctrine, this document influenced all later IO publications. The USAF first published IO doctrine in 1998 with the release of AFDD 2-5. In the eyes of the doctrine writers, this original attempt contained a number of conceptual faults, prompting the appearance of a substantially revised edition in 2005.[8] Ironically, the first edition did a better job of acknowledging the fundamental and universal nature of IO but awkwardly applied the doctrinal template of air warfare to IO principles, giving rise to such dissonant terminology as "offensive" and "defensive counter information."[9] Regrettably, both efforts have fallen short in articulating IO properly, but that is due to underlying problems with the characterization of information itself.

Evidence of the Problem

While the US military has a demonstrated capacity to dominate a situation with its technological supremacy and computer software, it has not yet mastered modern Information Warfare, where the most important software exists—between the ears of the local population.

—Frank G. Hoffman

Only a few documents trumpet our mastery of IO, but a myriad proclaim the opposite. According to Lt Col Charles Hardy of the US Army War College, "most senior military commanders . . . consistently state 'we are losing the Information Operations fight.'" He also notes that "it is universally accepted that the United States Armed Forces . . . do not apply this element of national power effectively."[10] As an influence-operations program manager in Headquarters USAF (A3), this author witnessed numerous instances of confusion and deficiencies in understanding IO, from tactical to strategic levels. Unsure about what to do with operational-planning billets funded to perform IO, commanders used them for other functions or left them empty. Automated programming and budgeting capabilities as well as assessment tools proved ill suited to accommodate nontechnical influence capabilities, causing difficulties in justifying appropriate funding levels for these programs. In coordination sessions, representatives from the so-called core capabilities of IO—electronic warfare operations, influence operations, and network warfare operations—shared no common frame of reference in terms of operational integration, organization, manpower, training, procurement, or funding. Other than their status as "declared" brethren within IO, little similarity existed between the disciplines. In that regard, Maj Thomas Kardos of the US Army Command and General Staff College describes IO doctrine as "ill founded" and "mistakenly" drawing from too narrow a range of features.[11] Similarly, in his assessment of IO in Iraq, Maj Norman Emery of the US Army laments that US forces' inability to use IO has hampered efforts to quell the insurgency there and has given the enemy an information advantage.[12]

The Information Domain Myth

We cannot get IO doctrine right because we mistakenly identify information as a *domain*, the latter defined by a standard dictionary as "a field or sphere of activity or influence." Nor do we find an acceptable definition

of *information* that makes it a domain, the former term defined as something told (i.e., knowledge or data). Information is a resource, a weapon of war and peace. Bullets, bombs, tanks, and pilots are not domains, but they are important aspects of war fighting—as is information, which may take many forms. In its tangible form, information exists and travels in physical space—in its electronic form, it does so in cyberspace. It also exists within the subjective realm of the human mind. Thus, rather than constituting a domain, information resides in and moves across domains. Before we can create the intellectual framework required for the proper understanding and doctrinal classification of IO as well as develop the concept of a legitimate cyberspace domain, we must realize that no single information domain or "environment" exists. IO really involves using information to generate effects that, like information itself, apply to all domains. Once we acknowledge that information is not a domain and is not bounded by a particular domain, then *by definition* we cannot classify IO in a manner analogous to domain-based doctrine (i.e., air warfare and space operations); neither can we define it *within* them.

From the first recognition of the power of information in modern war, a conscious effort emerged to establish it as a domain—a designation that ultimately led the USAF to juxtapose IO with air warfare and space operations, the subjects of the other domain doctrine documents.[13] Dr. George Stein of the US Air War College first articulated many of the principles fundamental to IO today, including the notion of an "information environment" or "realm."[14] With this concept in mind, USAF doctrine writers established the subcategory IO for the domain of information. Though meant to highlight the importance of information alongside the air and space operational domains, this arrangement does not withstand honest intellectual analysis and ultimately has negative implications for understanding and applying IO.

Current doctrine often presents IO as something the USAF does along with air and space operations; in fact, those operations often *produce* IO effects. The doctrine encourages war fighters to perceive a domain-based IO concept, but the ephemeral information domain defies intuitive grasp. Instead, by presenting IO separately from air and space, we give practitioners the mistaken impression that IO is "added in" or occurs "alongside" the other types of operations. Air and space operations are separate elements from IO (fig. 2). AFDD 2-5 also explains that IO is "integral to all Air Force operations and may support, or be supported by, air and space operations."[15]

Though true, this idea of mutual support and integration leaves out the fact that air and space operations can actually *be* IO (a point recognized clearly by early airpower theorists such as Billy Mitchell and Giulio Douhet, who asserted that the psychological effects of airpower on the enemy could prove decisive in war). Such diagrams and definitions leave the reader of doctrine with the impression that *only* network warfare operations, electronic warfare operations, and influence operations constitute IO. This is also incorrect. Properly understood, information and IO span domains. Many air and space activities can be planned for informational effects, whether in terms of psychology, information itself, or information systems.

Although it may take a monumental effort to eradicate the concept of the information domain, such a step is necessary to obtain a more accurate conceptualization of IO. References to the domain or environment of information have become ubiquitous. Even the 2007 edition of AFDD 2 states that "information is an environment in which some aspects of warfare can also be conducted," going on to specifically designate information as a domain, like air and space.[16] As daunting as the prospect of repudiating the information-domain paradigm may seem, the recent designation by the chief of staff and secretary of the Air Force of cyberspace as an official domain and its inclusion in the USAF mission statement provide the intellectual way ahead to make the change.[17] Doctrine writers must recognize cyberspace as the true domain for the types of information associated with the information technological revolution.

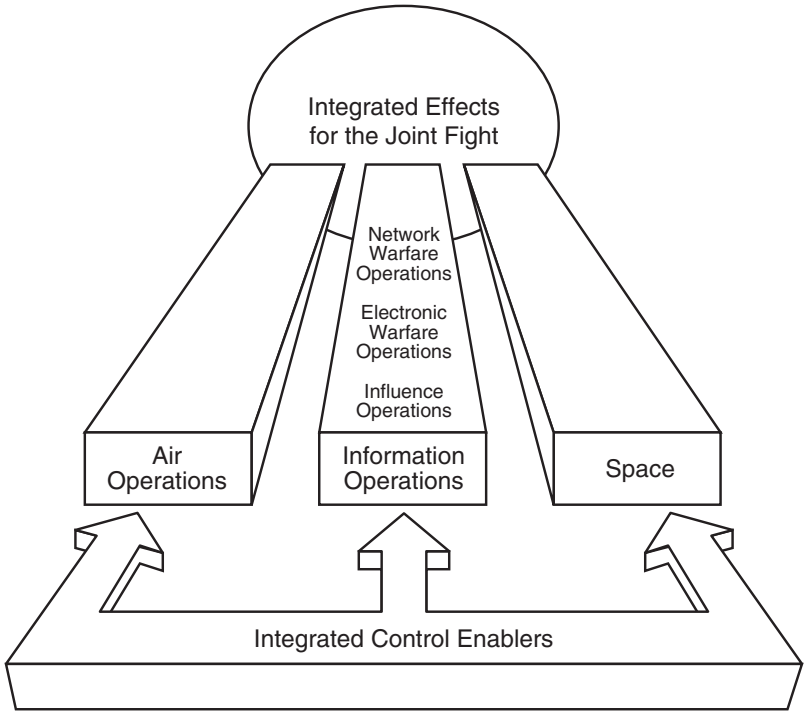

Figure 2. AFDD 2-5's relationship with IO and air/space operations. (Adapted from AFDD 2-5, *Information Operations*, 11 January 2005, 7, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-5.pdf.)

Defining Information Operations

After defining information properly and thus intellectually unshackling ourselves, we may more closely examine the definition and composition of IO itself. AFDD 2-5 defines IO as "the integrated employment of the capabilities of influence operations, electronic warfare operations, and network warfare operations, in concert with specified integrated control enablers, to influence, disrupt, corrupt, or usurp adversarial human and automated decision making while protecting our own."[18] By virtue of its narrowness, this description causes some problems. For example, under this definition, a strike mission to neutralize a fiber-optic relay station is not IO even though the effect it seeks to create entails disruption of adversarial decision making. A special operations forces team that captures and interrogates an enemy commander has seriously disrupted enemy decision making and added to friendly intelligence (refined information). Should not that be IO? Perhaps the perception that IO definitions were too broad motivated doctrine writers to define IO in this manner. Likely, they reasoned that more narrowly defining IO in terms of "nonkinetic" capabilities would facilitate understanding and application of IO as well as provide doctrinal treatment at long last for electronic warfare operations, network warfare operations, and influence operations. However, as currently defined, IO appears to be more of an orphanage for nonkinetic capabilities than a rational grouping based on true similarity. This "forced cohabitation" of concepts is not trivial since it fosters misconceptions about the nature of IO

and places undue emphasis on capabilities rather than effects.

Fundamentally, IO deals with *effects*—not capabilities or means. Therefore, many USAF capabilities that produce information *effects* are IO. This does *not* mean that everything is IO, but it does mean that we need a better, intuitive definition for IO that recognizes its broad nature and impact, not limited to a domain. IO fits squarely within the doctrinal concept of the effects-based approach to operations, which states that USAF operations focus upon objectives—not platforms, weapons, or methods.[19] For example, a planner may decide to use a bomb, a computer virus, or PSYOP to disable an enemy radar system, so long as the effect remains the same. Other than the fact that these subcategories of IO do not specifically require the release of kinetic bombs and bullets, they are very different. One would be hard pressed to come up with an example of an actual IO plan that consisted only of some combination of influence operations, electronic warfare operations, and/or network warfare operations. More often, IO looks like any other operation—only the timing and/or means are tailored to achieve an IO effect. This accounts for the ongoing debate about whether a B-52 strike on an air defense command facility constitutes IO or air warfare. Intuition and logic say it must be both, but current doctrine suggests otherwise.

The association of IO with specific capabilities versus effects presents a challenge for commanders who want to employ IO but are often unsure about how to combine influence operations, electronic warfare operations, or network warfare operations. Commanders and Airmen can easily overlook the IO aspects inherent in traditional applications of air and space power and may adopt a recipe approach to IO—a little electronic warfare operations here, a smidgen of network warfare operations there, and a dollop of influence operations just for good measure. In practice, because of its separate treatment from traditional, kinetic activities within air and space operations, IO tends to become marginalized, a situation that negatively affects budgeting, training, manpower, and employment.

Another key disparity between the stated core capabilities of IO involves the technical versus nontechnical. Many military professionals would be surprised to learn that IO actually is *not* a product of the revolution in information technology! The coincidence of *IO* as a term with technical advancement in information technology has led to the specious conclusion that they are one and the same. But IO does not necessarily concern itself with computers and disk drives. PSYOP and MILDEC, for example, can rely upon very low-tech methods yet remain effective.

The constituent elements of IO differ in more ways than their technological basis. Influence operations consist of operations security, MILDEC, PSYOP, public affairs, counterintelligence, and counterpropaganda. "Subjective" in nature (i.e., they target the human mind as well as the perceptions and decision making of the enemy or a population), these operations employ varied means in any medium. In contrast, electronic warfare operations—based on exploiting electromagnetic technology for combat effects—are "objective" in nature, employing specific technical means to generate effects in any domain, whether air, space, or cyberspace. However, simply being nonkinetic does not equate to information, and electronic warfare operations share little in common with influence operations. Finally, network warfare operations are quite different from influence operations and electronic warfare operations. Though technologically centered, they more narrowly focus upon computer systems and networks. In application, network warfare operations differ significantly from influence operations or electronic warfare operations, bearing little resemblance to traditional air and space operations and functioning squarely in the realm of cyberspace.

The incompatibility among IO elements as currently defined indicates that something is clearly amiss. Beginning with the information domain myth and extending throughout the capabilities of IO and into the emerging domain of cyberspace, the evidence points directly to a pressing need for a remedy. But what form should the cure take?

A New Doctrinal Architecture

Sometimes the solutions will require acknowledgement of past mistakes, and acceptance of insights for which none of our learning has prepared us.

—Prime Minister Malcolm Fraser

The solution to these doctrinal challenges lies not within the content per se but in the doctrine's definitions and construction. The framework of USAF operations doctrine needs an overhaul to add flexibility, logically place capabilities, and allow for future doctrinal growth. Toward those ends, this article makes the following specific recommendations: (1) eliminate the concept of information as a domain, redefine IO, and establish it as a fundamental, effects-based approach to the operations concept under AFDD 2; (2) define and institute two broad subcategories of operations doctrine known as objective and subjective operations to create doctrinal "space" for treatment of all conceivable types of operations, especially influence operations; and (3) create a new operational-domain category within AFDD 2 known as cyberspace operations.

Until we define IO properly, no one will recognize its full power. Information is not a domain, and IO is more than a laundry list of nonkinetic capabilities. It involves the generation of combat effects created by objective or subjective operations within the air, space, or cyberspace domains. Therefore, the following serves as a proper definition for USAF IO: *the integrated employment of Air Force capabilities to influence, disrupt, corrupt, or usurp adversary information, information systems, perceptions, and/or decision making while protecting our own.* This definition adds the word *information* and recognizes that information systems also affect perceptions and all decision making. This definition and placement offer a key benefit by ending the confusion and debate over what constitutes IO. A bomber can execute a doctrinally sound strategic-attack mission that generates IO effects. Special operations forces can perform foreign internal defense and IO at the same time. Some people may argue that this definition is too broad and not prescriptive enough. On the contrary, IO *is* a broad concept; artificially defining it more explicitly constitutes a disservice to everyone who uses it. In recognition of its broad applicability, IO should move doctrinally "above" the domain-based categories as a direct adjunct to AFDD 2. Given the status of intelligence, surveillance, and reconnaissance as an essential aspect of IO with ties to all three domains, it should be a subcategory of IO (fig. 3).

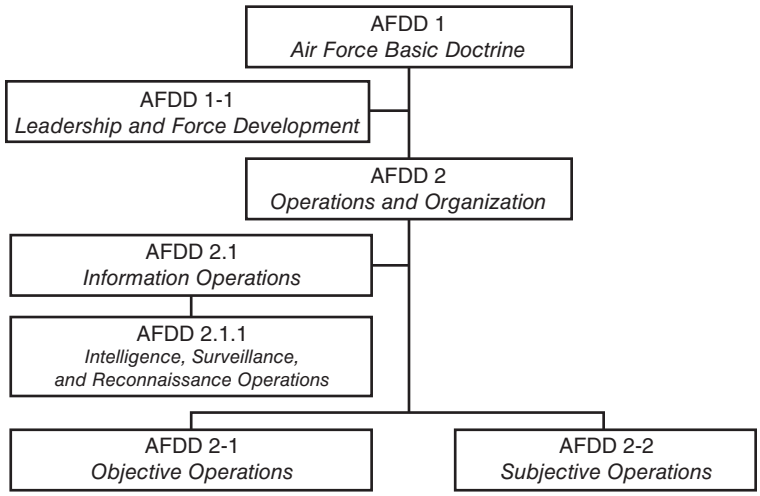

Figure 3. Operational doctrine, information operations, and objective and subjective categories

This new definition will facilitate IO planning and employment. Commanders will still appoint an individual to supervise an IO planning cell; however, the IO team will not be restricted to an arbitrary set of disciplines. Instead, its members will identify the effects and outcomes that IO can produce, and through coordination and integration with every element of the effort—proceeding from strategy to task—they will apportion the forces and define the tasks required to carry out the commander's intent.

The second recommendation entails creating categories of operational doctrine designated as objective operations and subjective operations (see fig. 3). Our dictionary defines *objective* as "having to do with a known or perceived object as distinguished from something existing only in the mind." Many air, space, and even cyberspace operations are objective in nature—that is, we conduct them in the physical world against physical targets. This author defines objective operations as *the subset of all operations conducted to achieve primary effects in the physical world and/or against objects perceived or known, as opposed to operations designed to influence the human mind.* In contrast, our dictionary defines *subjective* as "of, affected by, or produced by the mind." We conduct subjective operations across all physical domains to achieve cognitive effects. This author defines such operations as *the subset of all operations conducted to achieve primary effects in the cognitive domain and to influence the perceptions, emotions, and/or reasoning of a human target or targets.*

Creation of these classifications necessarily recognizes that military operations in the physical and cognitive domains differ sufficiently to warrant separate treatment. The objective operations / subjective operations doctrinal construct establishes a comprehensive doctrinal framework and creates an architecture in which the former constituent IO capabilities can find their proper place. More significantly, it elevates subjective operations from deep within the doctrinal hierarchy; divorces them from the objective, techno-centric disciplines of electronic warfare operations and network warfare operations; and imbues them with the visibility needed for appropriate understanding. We have not readily understood the importance of subjective operations to warfare in the technological age, but now more than ever, with direct combat against an identifiable enemy an increasingly difficult proposition, the ability to influence adversaries and communicate truthfully to friends and allies has become essential. Indeed, AFDD 2 sagaciously states that "*there is a psychological component to almost every set of effects and this component is often among the most important in terms of achieving objectives*, especially at the operational and strategic levels" (emphasis in original).[20]

Figure 4 illustrates the proposed structure of a doctrinal category of subjective operations. Influence operations and a new subcategory—strategic communications—become the key elements of subjective operations. Influence operations are simplified to two main elements—MILDEC, which targets the mind of an individual decision maker, and PSYOP, which targets an adversary populace or group. Influence operations do not necessarily depend upon specialized hardware or advanced technology. But they do depend upon the ability of the influence operations planner—aided by accurate intelligence and human-factors analysis—to get into the mind of the target(s) and creatively produce operations that result in the desired effect (normally an action or inaction). The other currently defined capabilities of influence operations—operations security, counterintelligence, public affairs, and counterpropaganda—are logically redistributed. Operations security falls within the parent IO category since it applies across all operations and domains. Counterintelligence appears within intelligence, surveillance, and reconnaissance as a natural counterpoint to intelligence. Counterpropaganda comes under the parent category of subjective operations because it can be conducted by PSYOP and public affairs, for example. Public affairs becomes the cornerstone of strategic communications. Like MILDEC and PSYOP, public affairs also targets the mind—but with truthful, credible information. Though AFDD 2-5 lists public affairs as an element of influence operations, the USAF public affairs community has understandably disassociated itself

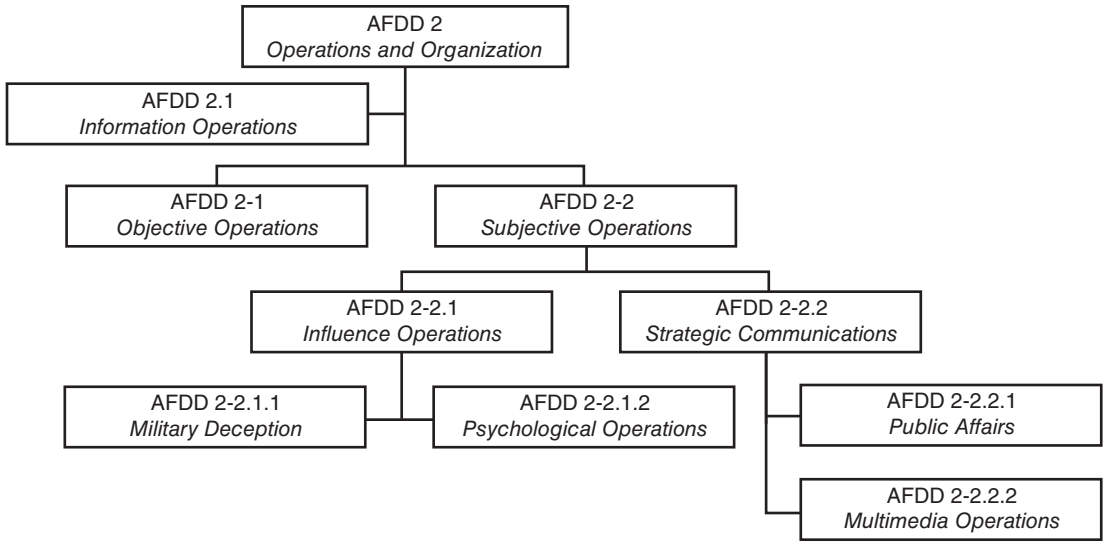

Figure 4. Structure of subjective operations

from "influence" and has created an Office of Strategic Communications, which merges public affairs with multimedia operations such as videography, photography, and broadcasting. Maj Gen Erwin Lessel III, former director of this office, notes that strategic communications depend upon truthfulness to establish credibility with all audiences, stressing that "there is a difference between wanting to inform people or influence them, and there are appropriate ways to do both."[21] Thus, the subcategories of public affairs and multimedia operations become the fundamental elements of the strategic communications category. This framework is more consistent with the requirement to maintain appropriate separation between influence in the form of MILDEC and PSYOP and to inform through strategic communications. These changes result in a doctrinal category of subjective operations that is complete and complementary to objective operations.

Figure 5 illustrates the structure of the objective operations category. These operations consist of all operational categories and their supporting functions (e.g., combat support and weather operations) that function in physical domains against objective target sets (e.g., destroying a bridge, protecting a network, launching a satellite, transporting troops, etc.). As a cosmetic change, *air warfare* is renamed *air operations* for the sake of consistency. As an objective operation that spans domains, electronic warfare operations assume an appropriate position alongside the domain categories under objective operations. This designation eliminates the arbitrary placement of these operations as an IO core capability and establishes the doctrinal flexibility to accommodate future doctrine on directed energy.[22] At the same time, proper treatment of network warfare operations requires implementation of the final recommendation—creation of a domain-based operational category of cyberspace operations.

Creation of the doctrinal classification of cyberspace operations represents a significant and necessary part of this proposal (see fig. 5). In 2005 the secretary and chief of staff of the Air Force redefined the service's mission as "deliver[ing] sovereign options for the defense of the United States of America and its global interests—to fly and fight in Air, Space, and *Cyberspace*" (emphasis added). Furthermore, the secretary decreed that "defending and fighting in the Cyber Domain is absolutely

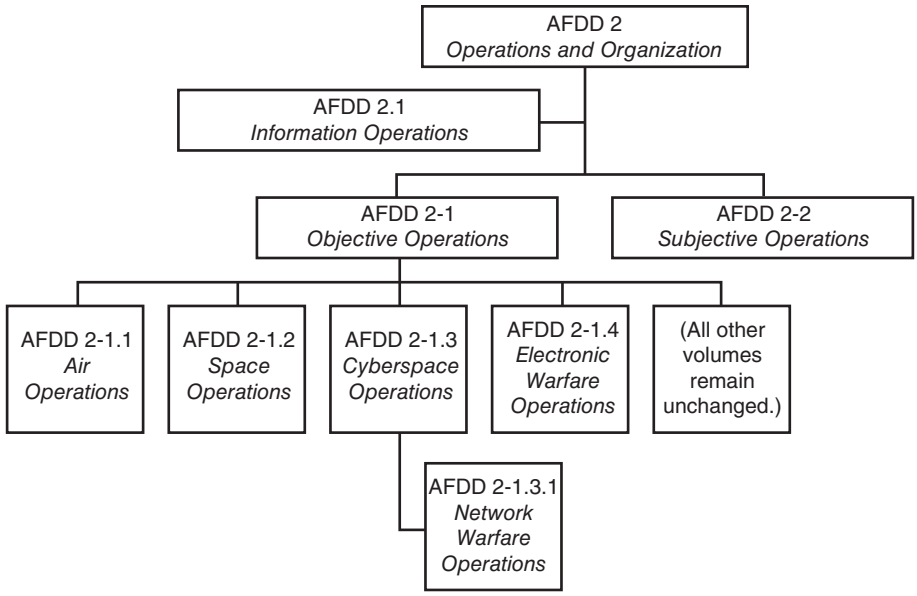

Figure 5. Structure of objective operations

critical to maintain operations in Ground, Sea, Air and Space."[23] This author defines cyberspace operations as *the employment of Air Force capabilities to defend and exploit electromagnetic information processing, storage, and transmission systems for military effect.* Computers and networks are the gateways for cyberspace, so network warfare operations logically belong within cyberspace operations. Network warfare operations establish cyber dominance, just as air and space operations establish air and space dominance.

In the final analysis, this proposal amounts to nothing if the end results do not translate into positive, meaningful effects for the war fighter. Figure 6 illustrates how each operational concept relates to the overall operation, maximizes its own unique capabilities, and integrates them to produce synergistic effects across the full spectrum of operations. The principle resembles that of the joint force—each service specializes along functional lines to build maximum power and then integrates that power into the joint force.

IO is that subset of all operations that generate information effects or use information as a tool to realize objectives. All the elements of IO are visible and present in this model, thus allowing for proper focus and emphasis on each critical piece and discouraging the tendency to paint IO with a broad brush as a monolithic concept—a practice that has watered down its efficacy by marginalizing its constituent elements. With the focus on effects and the elimination of artificial associations, planners are free to combine capabilities in the most efficient manner, resulting in synergy and economy of force.

Without question, the implications of these recommendations extend beyond IO and USAF doctrine. In order for this proposal to have any enduring effect, adoption and standardization will have to take place within the entire government and military community, including the Department of Defense, the Joint Staff, and sister services. Even then, we would need a great deal of intellectual effort to flesh out the new IO doctrine and set up conceptual foundations for objective operations, subjective operations, and cyberspace operations. Although it is never too late to get the doctrine right, the sooner we do so, the better. Every day that passes brings further os-

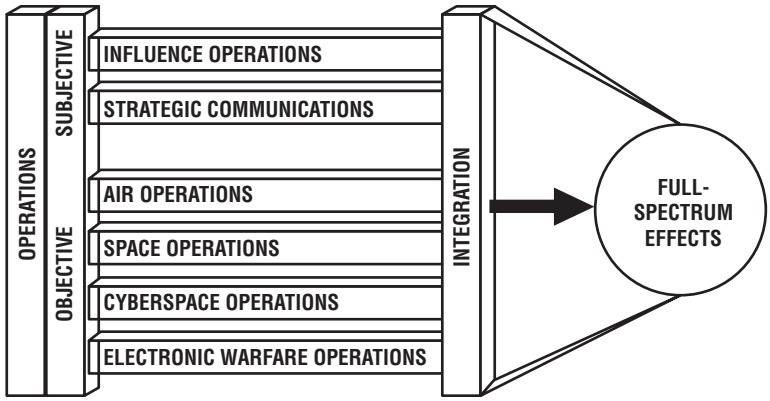

Figure 6. Operational model for integrated effects

sification to a body of IO doctrine that remains confusing and ineffective to the war fighter.

Conclusion

The information domain myth and current doctrinal treatment of IO have led to uncertainty about what IO is and its relationship to the other elements of operations. Logical analysis reveals IO as a broader, more fundamental concept than we currently acknowledge. The solution to this quandary starts with refutation of the idea of information as a domain, which enables us to redefine IO and establish it as a more fundamental component of operations doctrine—a key supporting function to all operations rather than another domain-based category such as air, space, or cyberspace operations. Furthermore, the institution of a broader doctrinal architecture—as represented by the parent categories of subjective and objective operations—creates the room within doctrine to establish visibility and promote development of traditional operational concepts as well as those that target the cognitive domain. Instead of an information environment, we can speak of the subjective environment, and everyone will understand that the effects and objectives are cognitive and perceptual. Implementation will naturally lead to improvements in funding, organizing, training, and equipping our forces to produce war-winning results. Lastly, creating a cyberspace domain puts the finishing touch on a long-overdue doctrinal renovation that should stand the test of time. By reforming doctrine in this manner, war fighters of the future will better understand IO and IO-related doctrine, creating a more efficient and effective force across the entire spectrum of warfare. Our forces will have the knowledge and tools to turn the tide on our adversaries and, hopefully, give critics of IO much less to write about. ❑

Notes

1. Here, the term *messages* refers not to specifics such as e-mail, radio signals, or memoranda but to the general idea of any information transmission/reception by any means. For example, a carrier strike force sends a "message" because it creates perceptions in those observing it. The message is the information conveyed by the action or inaction of forces under our control and can include deception and psychological operations.

2. Many definitions of *cyberspace* exist, but perhaps the best is also the simplest and least constraining. Appropriately enough, one can find this term defined in an online dictionary as the "realm of electronic communication."

Dictionary.com, http://dictionary.reference.com/browse/cyberspace. Perhaps a better definition would be "the domain in which information moves or resides while in electromagnetic form." Examples of cyberspace include fiber-optic transmission lines, wireless signals, magnetic or optical storage devices, or computer chips.

3. Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (Oxford: Oxford University Press, 1963), 66.

4. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, ix, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd1.pdf.

5. Ibid., 7.

6. Ibid., 3.

7. *Cornerstones of Information Warfare* (Washington, DC: Department of the Air Force, 1995), http://www.c4i.org/cornerstones.html; see also Maj James L. Griffith, "United States Air Force Information Operations Doctrine: Is It Relevant?" (thesis, US Army Command and General Staff College, Fort Leavenworth, KS, 2000), 49.

8. AFDD 2-5, *Information Operations*, 11 January 2005, [i] ("Summary of Revisions"), https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd2-5.pdf.

9. AFDD 2-5, *Information Operations*, 5 August 1998, v, http://www.dtic.mil/doctrine/jel/service_pubs/afd2_5.pdf (accessed 30 August 2006).

10. Lt Col Charles K. Hardy, "Information Operations as an Element of National Power: A Practitioner's Perspective on Why the United States Can't Get It Right," strategy research project (Carlisle Barracks, PA: US Army War College, 2005), 1, http://www.strategicstudiesinstitute.army.mil/pdffiles/ksil126.pdf.

11. Maj Thomas J. Kardos, "Information Superiority: Seeking Command of the Cyber-Sea" (thesis, School of Advanced Military Studies, US Army Command and General Staff College, Fort Leavenworth, KS, 2000), 5.

12. Maj Norman Emery, "Information Operations in Iraq," *Military Review* 84, no. 3 (May–June 2004): 11, http://calldp.leavenworth.army.mil/eng_mr/2006080808030243/2004/03_May_Jun/04_emery.pdf#xml=/scripts/cqcgi.exe/@ss_prod.env?CQ_SESSION_KEY=WSOMSUNSXHEQ&CQ_QH=124697&CQDC=5&CQ_PDF_HIGHLIGHT=YES&CQ_CUR_DOCUMENT=9.

13. Generally attributed to the immediate aftermath of the first Gulf War, ca. 1991.

14. Griffith, "United States Air Force Information Operations Doctrine," 47–48.

15. AFDD 2-5, *Information Operations*, 11 January 2005, 1.

16. AFDD 2, *Operations and Organization*, 3 April 2007, 21, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/AFDD2.pdf.

17. SSgt C. Todd Lopez, "Cyber Summit Begins at Pentagon Nov. 16," Air Force Print News, 15 November 2006, http://www.af.mil/news/story.asp?storyID=123032005 (accessed 17 November 2006).

18. AFDD 2-5, *Information Operations*, 11 January 2005, 1.

19. AFDD 2, *Operations and Organization*, 13.

20. Ibid., 90.

21. SSgt Julie Weckerlein, "Strategic Communication Applies to Every Airman," Air Force Print News, 20 September 2006, http://www.af.mil/news/story_print.asp?storyID=123027426 (accessed 17 November 2006).

22. For example, directed-energy weapons may operate and cause effects in air or space and from air or space; therefore, electronic warfare operations must *not* be a subcategory under air or space operations. They must remain separate. By placing electronic warfare operations outside the other domain-based doctrine categories, we are free to include doctrine on their use in any domain.

23. Secretary Michael W. Wynne and Gen T. Michael Moseley, "SECAF/CSAF Letter to Airmen: Mission Statement," 7 December 2005, http://www.af.mil/library/viewpoints/jvp.asp?id=192; and Michael W. Wynne, "Cyberspace as a Domain in Which the Air Force Flies and Fights" (remarks to the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance Integration Conference, Crystal City, VA, 2 November 2006), http://www.af.mil/library/speeches/speech.asp?id=283 (accessed 17 November 2006).

Every Airman should read, discuss, and practice doctrine, and ensure that it adapts as necessary to remain applicable in our changing environment.

—Gen T. Michael Moseley, Chief of Staff, US Air Force

Range and Persistence

The Keys to Global Strike

Col Phillip S. Meilinger, USAF, Retired

Editorial Abstract: Global attack, one of the US Air Force's distinctive capabilities, is directly attributable to range and persistence. These two abilities, long problematic for the Air Force, rely on very old airframes (bombers and tankers) and increasingly unreliable strategies for overseas basing. Colonel Meilinger proposes the acquisition of new platforms to ensure continued Air Force supremacy in these areas, including new long-range strike platforms, improved air refuelers with defensive capability, and unmanned strike platforms.

EVEN BEFORE THE invention of the airplane, visionaries had debated what effect it would have on warfare; indeed, novelists wrote of aerial armadas that would defeat the tyranny of terrain. Aircraft would fly over seas, mountains, and fortresses that hindered armies and navies. From the airy heights, aircraft could devastate an enemy's defenses.

At the same time, we also noted the airplane's limitations—technical challenges that we needed to address and overcome. In the decades since, we have aggressively attacked all of these challenges and made dramatic improvements. We have effectively dealt with the issues of speed, payload, navigation/accuracy, self-defense, safety/reliability, all-environment operations, and connectivity/responsiveness

through technology and operational solutions. One technical problem, however, has not so readily lent itself to fixing—range and the associated factor of persistence.

Global attack is one of the US Air Force's six distinctive capabilities, as defined in its doctrine.[1] "Global" means "range." To neutralize or hold at risk targets thousands of miles distant, we need strike assets that can put ordnance precisely on target at great range—a tremendous challenge. The distance an aircraft can travel (range) and its time on station (persistence) are functions of fuel and human endurance. The Air Force has tried to meet these two requirements through forward basing, air refueling, and long-range strike platforms (bombers). Today, those first two options are becoming increasingly problematic.

We may not have access to air bases close to a conflict for political reasons, or they may be vulnerable to attack. Air refueling carries risks in an era of long-range surface-to-air missile (SAM) systems. Long-range strike platforms, perhaps mated with standoff weapons, offer the logical solution to the global-strike mandate.[2]

Forward Basing

The United States requires access to overseas bases near a crisis area. In Operation Iraqi Freedom, the Air Force used 36 air bases, many of which it had to hastily construct or upgrade. This is not a new problem. Air operations at the beginning of both the Korean and Vietnam Wars were constrained by a shortage of air bases having the requisite runways, ramp space, utilities access, and maintenance facilities.[3]

Air Base Politics

As mentioned above, we may not have assured access in future crises for two reasons. The first is political: a country may prove unwilling to allow US military forces to use its soil or overfly its territory. It may wish to help but nonetheless demur due to disagreements over US objectives, domestic concerns, or fear of reprisal.[4] We witnessed a demonstration of the first case during Iraqi Freedom when France and Germany did not agree that an invasion of Iraq was necessary and lent no support to the US-led effort. Similarly, after Operation Desert Storm, Saudi Arabia was reluctant to allow US aircraft to use its bases for strikes against Iraq because of domestic opinion. Furthermore, Spain's withdrawal from Iraq in 2004 after a terrorist attack on the Madrid train system showed how reprisals can dictate government policy.[5]

Operational flexibility and foreign-policy initiatives can mitigate these concerns. Thus, despite the denial of airfields in Saudi Arabia, facilities in Kuwait, Bahrain, Qatar, Pakistan, and elsewhere proved sufficient. Yet, the coalition air commander in Iraqi Freedom—T. Michael "Buzz" Moseley, then a lieutenant general—warned that the United States could not count on such bases: "In the future, we will require deep strike capabilities to penetrate and engage high-value targets during the first minutes of hostilities anywhere in the battlespace."[6]

In short, we have assumed that if a country is in trouble and requests our help, then it will make bases available for our use. Now, however, the United States finds itself in need. We require bases in order to prosecute the war on terrorism. Will they be available?

Air Base Vulnerability

The greatest utility of overseas bases is their proximity to potential crisis areas. The greatest limitation of overseas bases is their proximity to potential crisis areas. The issue involves vulnerability—an old problem. Following World War II, Strategic Air Command deployed most of its bombers to forward bases in Europe, the Middle East, and Asia—within unrefueled striking distance of their targets in the Soviet Union.[7] In 1954, however, a RAND study concluded that these bases were vulnerable to a Soviet strike. This report had enormous impact—within a year, the Air Force ordered its first KC-135 tanker.[8] The new strategy called for launching bombers from bases in the United States—air refueling would get the strike aircraft to their targets and back. Strategic Air Command then pulled its bases back to the periphery for use as staging areas in the event of war.

US fighters remained at European bases—North Atlantic Treaty Organization (NATO) airfields that had dispersed facilities, hardening, air defense systems, stocks of spare parts, and pre-positioned fuel and ordnance. We believed that these semihardened bases would survive a Soviet strike—at least until the Air Force ran an exercise called Salty Demo at Spangdahlem Air Base, Germany, in 1985, which measured an air base's ability to survive conventional as well as chemical attacks and then generate sorties afterward. The scenario envisioned simulated air strikes by Soviet aircraft and ground attacks by Spetsnaz commando units, subjecting Spangdahlem to simulated destruction. Personnel built an Alternate Launch and Recovery System (ALRS)—a temporary runway—and then deliberately blew it up.[9] Buildings or systems designated as "destroyed" by enemy attacks were out of play for the remainder of the exercise. Personnel judged as injured received "treatment" in the hospital and, if appropriate, returned to duty. Those "killed in action" were out of the exercise. Combat engineers repaired craters made in the ALRS, and crews launched and recovered aircraft on the repaired surface.

Although details remain sketchy, enough data has emerged from Salty Demo to indicate that such attacks would have had a serious impact on the wing's ability to function. We would need to initiate a host of actions to ensure that an air base could survive and fight while under attack: improved chemical protective gear, hardened shelters, technologies for the rapid repair of runways, redundant communications, perimeter defenses, and better air defenses.[10]

The results of Salty Demo proved as sobering as the RAND study of 30 years earlier. Ironically, however, the problem appeared so massive that we decided we could do little about it. Rebuilding NATO airfields to enable them to survive a Soviet attack would cost billions of dollars. Fortunately, the Cold War ended a few years later, so we forgot the problem of air base vulnerability—until Desert Storm in 1991.[11]

Iraq could not compete with the coalition in the air, so it relied on an asymmetric strategy that saw 88 Scud missiles fired at coalition forces and Israel. Our defenses stopped few, if any, of these missiles, and one killed 28 US soldiers and wounded 97 more in a barracks in Saudi Arabia.[12] Consequently, the Air Force once again began worrying about its air bases. Fortunately, our ballistic missile defenses have improved since then. During Iraqi Freedom, Patriot missiles intercepted all nine of the Iraqi ballistic missiles fired at "defended assets," but we have certainly not eliminated threats.[13]

Cruise missiles are emerging as a serious threat. We have difficulty detecting these weapons at their ground locations because of their small size and lack of extensive support equipment. When launched they don't generate a dramatic fire plume, as do ballistic missiles—a characteristic that allows detection by satellites. They fly subsonically at low altitude, following an irregular and unpredictable path. "Look-down" radars have difficulty distinguishing them from ground clutter, and the Patriot's radar cannot pick up these low flyers until it is too late.[14]

Worse, we face a proliferation of cruise missiles, with over 75,000 located in 75 countries today. Although most are antiship versions, some—notably the Chinese-made Silkworm—can be converted into land-attack variants that have a range of over 300 miles. During Iraqi Freedom, we failed to detect (much less intercept) any of the five cruise missiles that the Iraqis fired at coalition positions.[15]

The weaponized light aircraft or unmanned aerial vehicle (UAV) also represents an emerging threat. Over 400 different light-aircraft "kits" are available on the commercial market: some cost less than $30,000, have a range of several hundred miles, and can carry a payload of 500 pounds. Replacing the pilot with an autopilot guided by the global positioning system—also available commercially for around $5,000—produces a large weapon difficult to detect and stop.[16] Worse, cruise missiles and UAVs are ideal platforms for dispensing chemical or biological agents. Acting like crop dusters, they could easily spray deadly substances over a wide swath of land.

Finally, we must consider the threat of enemy ground forces and terrorists. In Vietnam, Vietcong attacks destroyed 99 US Air Force air-

craft and damaged another 1,170.[17] Sanitizing the area around US facilities presents problems as well as possible tensions with host countries. The terrorist bombing of the Khobar Towers in June 1996 resulted partly from Saudi Arabia's refusal to allow the extended defense perimeter necessary to ensure the barracks' safety.[18] We should also note that North Korea has 22 brigades of special forces who, in the event of war, will infiltrate the south and attack US/South Korean air bases.[19]

Clearly, because overseas bases face numerous threats, we may not have access to them in future crises. The austere bases hurriedly established for Operations Enduring Freedom and Iraqi Freedom were of a vulnerable, almost flimsy, nature. Aircrews and support personnel often lived in tents; aircraft, logistics facilities, and fuel supplies were similarly exposed. Enemy aircraft or missiles could have wreaked havoc there. We should assume that enemies in a future crisis will target our air bases. Will they survive and permit sustained combat operations? If not, then we will have an increased need for long-range strike assets.

Air Refueling

Air refueling became widespread in the 1950s, and during the Vietnam War, most of the US strike aircraft that flew over North Vietnam required it—essentially turning tactical fighters into strategic bombers.[20] But this dependence on aerial refueling presents problems. Our current tankers—the KC-10 and KC-135, based on commercial-airliner designs—are not stealthy and have no self-defense capability. Until now, this has not caused problems—we have never lost a tanker to enemy action.[21] How much longer can we guarantee this invulnerability?

Antiaircraft artillery (AAA) and SAM systems, a longtime bane of aircraft, have claimed far more US planes than have other aircraft.[22] Since World War II, air-to-air combat claimed only around 210 of the approximately 3,250 US Air Force aircraft lost in fighting—about 6.5 percent of the total.[23] AAA and SAMs are the real killers; unfortunately, a proliferation of new SAMs poses an enormous risk to our planes.

The most dangerous of these SAMs, the so-called double-digit missiles (SA-10, -12, and -20), have a "hit probability" of at least 90 percent against nonstealthy aircraft, making low-maneuverability platforms such as tankers or airlifters especially vulnerable.[24] Russia, China, India, Iran, and Syria now field these SAMs. The SA-20, the newest and most capable foreign-made SAM system, is mobile, has a range of over 200 miles, can engage six targets simultaneously, and can be reprogrammed quickly. An upgraded version of this impressive system is already under development.[25] Even with heavy jamming and clever tactics, our nonstealthy fighters would find these missiles a very serious threat, and our tankers would not have a chance. In the air war over Serbia in 1999, the NATO air component commander remarked that his greatest nightmare was that somehow the Serbs would acquire an SA-10 or SA-12 battery.[26] Fortunately, they did not.

Long-Range Strike Platforms

The access issue, when combined with the emerging SAM threat, means that we would have to base aircraft outside the range of enemy missiles or far out at sea. Aircraft would then air refuel as they approached the enemy's border. Because of the SAMs, tankers would have to remain over 200 miles out, imposing a limited penetration capability on current strike fighters—assuming they could get past the SAMs. Moreover, they would have little persistence once they reached enemy airspace. At normal airspeed, every hour a fighter loiters reduces its combat radius by 250 miles.[27] This means that fighters would almost certainly have to go after fixed targets because the lack of extra fuel would not allow a hunt for mobile targets. Since the F-22 and F-35 will not have greater range than current fighters, the SAM threat that keeps the tankers at bay will limit their penetration to barely 100 miles.[28] A need to maneuver would reduce their range even more.[29]

One solution for extending the effective reach of these fighters entails arming them with

standoff weapons. We have several options available. The conventional air-launched cruise missile (CALCM) can carry a 3,000-pound warhead over 600 miles. The Joint Air-to-Surface Standoff Missile (JASSM), a stealthy cruise missile with a range of over 200 miles (a proposed extended-range version would go 500 miles), has a 1,000-pound warhead and can be reprogrammed to a new target while in flight. The standoff land attack missile-expanded response (SLAM-ER), another reprogrammable air-launched cruise missile, has a 500-pound warhead and a range of over 150 miles. The Small-Diameter Bomb (SDB) can glide up to 60 miles, and the Low Cost Autonomous Attack System (LOCAAS)—a small flying bomb under development—is designed to loiter for up to 30 minutes or travel 100 miles. On the downside, only the SDB and LOCAAS are currently programmed for the F-22 and F-35. The longer-range and more powerful CALCM, JASSM, and SLAM-ER are too large for these new fighters.[30] In sum, current plans call for mating our short-range stealthy fighters with only short-range standoff weapons.

On the other hand, long-range strike aircraft have proven invaluable for US military operations, handling a disproportionate load of strike missions and weapons delivered. In Desert Storm, B-52s flew 1,741 combat sorties—only 3.9 percent of the total strike sorties flown by the coalition—but dropped 32 percent of all tonnage.[31] Over Kosovo/Serbia, bombers flew 322 of 9,500 strike sorties—only 3.6 percent—yet delivered 48 percent of all munitions. Six B-2 stealth bombers proved especially valuable during the operation, flying 45 combat sorties that averaged 28–32 hours in length; these few missions—less than .5 percent of the total—accounted for one-third of all the precision-guided munitions dropped during the war.[32] In Afghanistan, 18 B-1s and B-52s operating out of Diego Garcia logged 10 percent of all strike sorties but dropped 67 percent of all munitions during the critical period from October through December 2001. Of note, these bombers, which flew missions lasting 12–15 hours, did not usually have assigned targets when taking off; rather, they arrived in the area and loitered, waiting to receive "emerging targets" from air or ground controllers.[33] B-2s also flew in Afghanistan—one sortie lasted 44 hours. In Iraqi Freedom, B-1s and B-52s accounted for more than two-thirds of all the bombs dropped in that conflict.[34]

Persistence and Crew Fatigue

Persistence has endured varying fortunes. In one sense, the desire to remove the transitory nature of airpower—one of its traditional criticisms—has always been strong. Air refueling solved one problem but did little to alleviate the physical limitations inherent with crew members on small aircraft. The issue of crew fatigue induced by long flights, combined with excessive stress and frequent deployments, has been well studied. Basically, the human body and mind get tired when immobilized, cramped, or bored—they need sleep. Flight surgeons sought to discover how sleep could be deferred or stolen in small increments to enable a short-term boost in performance.

The usual response to these problems—diet, exercise, physical fitness, and a stable routine—is usually ineffective. Alternatively, personnel in multicrew aircraft take short naps in flight. Pilots of single-seat fighters, however, do not have this option, so medication becomes the next step. Since the early 1960s, the Air Force has employed "go/no-go" pills to regulate the sleep cycles of aircrews—to make them sleep before a flight and keep them awake during it. No-go pills have had mixed success. Aircrews often do not want to take them, or, because of nervousness or other distractions, the pills simply don't work.

Go pills—amphetamines—are designed to keep pilots awake. During Desert Storm, 57 percent of fighter pilots in single-seat aircraft reported using them.[35] Reputedly fairly benign drugs, they may nonetheless produce such side effects as cardiovascular disturbances, psychiatric problems, addiction, drug tolerance, and disruptions in sleep recovery—certainly not minor reactions.[36] In April 2002, an F-16 pilot bombed what he believed were enemy troops near Kandahar in Afghanistan. In fact the attack killed four Canadians. The pilot claimed that he had taken go pills, and his defense attorney at the subsequent court-

martial used as a mitigating circumstance the fact that a flight surgeon had prescribed them—despite their known deleterious side effects.[37]

In sum, absent the possibility of getting up, moving about, stretching, or using the latrine, a pilot can go no more than 10 hours strapped into a single-seat fighter. Even then, ground crews often have to help the exhausted Airman from the cockpit upon landing. All of this means that acquiring long-range strike assets will become an imperative, given the possibility of fighting a future enemy on a large continental landmass such as China.[38]

To illustrate the problem, fighter aircraft traversing the 2,000 miles separating the Asian continent from Guam, the nearest air base on US territory, would require at least four tanker hookups. This would still take a heavy toll on the aircrews. A round-trip mission from Guam to the Asian coast at normal airspeeds would take nearly 10 hours—certainly a grueling assignment.[39] In bombers, crew members can get up and move about, perhaps even nap during long flights.[40] During the Vietnam War, the B-52s based on Guam flew thousands of such combat sorties. In Kosovo, B-2s flew missions lasting more than 30 hours from their base in Missouri with no degradation in performance.[41]

One should also note that the increasing reliance on UAVs makes a great deal of sense. These platforms, combined with more capable sensors and precision weapons, offer possible solutions to the problems with range/persistence. UAVs allow a previously unobtainable loitering capability—with no crew-duty limitations.[42]

Conclusion

Perhaps the most enduring theme of air and space power is its global character, which enables the United States to project influence worldwide. Although Airmen have grappled with a number of technological challenges for a century, a nagging issue remains—range and the associated need for persistence. In decades past, we addressed these problems by forward basing, air refueling, and long-range strike aircraft. Today, forward bases may not be available due to political constraints or the proliferation of ballistic and cruise missiles tipped with weapons of mass destruction. Increasingly effective ground-based air defenses will render our nonstealthy air refuelers too vulnerable to fly close to a crisis area.

Part of the solution may still reside in a new tanker for which the Air Force is now soliciting bids. Given the age and increasing problems with the KC-135 fleet, this has become an essential step. Although a new tanker probably won't have stealthy features, the Air Force should insist that it incorporate a self-defense capability that would permit the aircraft—and accompanying fighter-bombers—to approach enemy territory more closely and thus deny the adversary a larger sanctuary.

A long-range strike platform for the future remains the most logical solution. Numerous designs for this mission have emerged—anything from hypersonic unmanned vehicles to stretched "FB"-22s. However, we must maintain our emphasis on range—the crucial nut that needs cracking. Moreover, the Air Force must not allow the budget process to cut this new program. Yes, many priorities vie for scarce dollars, but long-range strike must stay at the top of the list. Similarly, stealthy standoff weapons that can fit inside the small internal bomb bays of the F-22 and F-35 should make up part of the solution. In decades past, we endured the distressing phenomenon of air-delivered ordnance receiving short shrift. That tendency has changed due to the revolution in precision-guided weapons, but the trend must continue. Also, we must find something other than medication to squarely address the very real problem of crew limitations. Using aircraft with multiple crew members offers one solution, as does the use of unmanned strike platforms.

What we must *not* do is rely on short-range fighters—a policy that assumes away the problems of access, tanker vulnerability, and crew endurance. That would be foolish. For nearly a century, we have wrestled with the issues of range and persistence—the ability to hold enemy targets at risk from extended distances. The Air Force's distinctive capability of global strike demands long-range strike assets. ❑

Notes

1. Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, 17 November 2003, 76–82, https://www.doctrine.af.mil/afdcprivateweb/AFDD_Page_HTML/Doctrine_Docs/afdd1.pdf.

2. Conventionally tipped intercontinental ballistic missiles offer a possible option, but they have serious drawbacks, including cost, small numbers, inability to hit moving targets, and the difficulty experienced by observers (China and Russia) trying to distinguish between a conventional- or nuclear-weapon launch.

3. Robert F. Futrell, *The United States Air Force in Korea, 1950–1953*, rev. ed. (Washington, DC: Office of Air Force History, 1983), 67–73, 109–12, 191–94, 394–99; and Robert F. Futrell with the assistance of Martin Blumenson, *The United States Air Force in Southeast Asia: The Advisory Years to 1965* (Washington, DC: Office of Air Force History, 1981), 110, 177, 263–64. See also Squadron Leader Sal Sidoti, *Air Base Operability: A Study in Air Base Survivability and Post-Attack Recovery* (Canberra, Australia: Aerospace Centre, 2001), 26–31, 38.

4. See David A. Shlapak et al., *A Global Access Strategy for the U.S. Air Force* (Santa Monica, CA: RAND, 2002), http://www.rand.org/pubs/monograph_reports/2005/MR1216.pdf. During Operation El Dorado Canyon in 1986, France and Spain denied overfly rights to F-111 aircraft launching from Britain, essentially doubling the flight duration.

5. Fear of reprisal is not simply about terrorist attacks. Because Portugal allowed US aircraft to land at Lajes Air Base, Azores, to refuel en route to Israel during the 1973 Yom Kippur War, the Arab states cut off oil shipments to Portugal. Shlapak et al., *Global Access Strategy*, 22.

6. Laura M. Colarusso, "Suddenly, USAF Wants a New Bomber," *Defense News*, 7 June 2004, 1, 8, http://www.globalsecurity.org/org/news/2004/040607-bomber.htm.

7. See Elliott V. Converse, "United States Plans for a Postwar Overseas Military Base System, 1942–1948" (PhD diss., Princeton University, 1984); and Harry R. Borowski, *A Hollow Threat: Strategic Air Power and Containment before Korea* (Westport, CT: Greenwood Press, 1982), chap. 4.

8. A. J. Wohlstetter, "Selection and Use of Strategic Air Bases," Study R-266 (Santa Monica, CA: RAND, April 1954). The increasing speeds of jet bombers such as the B-47 and B-52 also necessitated a jet tanker that could keep up.

9. Bombs that penetrate a runway or taxiway surface cause significant damage due to the rupture and upheaval of underlying layers. Repair is neither quick nor easy. Sidoti, *Air Base Operability*, 88–94.

10. For an unclassified overview of the exercise, see Headquarters USAFE/PAM, "Salty Demo Q's & A's," 11 October 1984, Air Force Historical Research Agency, Maxwell AFB, AL, file K570.01. See also John T. Correll, "Fighting under Attack," *Air Force Magazine* 71, no.10 (October 1988): 50–55; and Edgar Ulsamer, "The Fog of War," *Air Force Magazine* 68, no. 10 (October 1985): 74–78.

11. For an excellent overview, see Christopher J. Bowie, *The Anti-Access Threat and Theater Air Bases* (Washington, DC: Center for Strategic and Budgetary Assessments, 2002), http://www.csbaonline.org/4Publications/PubLibrary/R.20020924.CSBA_AirBases/R.20020924.CSBA_AirBases.pdf.

12. Col Charles A. Anderson, "Air and Missile Defense," *Army*, January 2004, 41–47; and Theodore A. Postol, "Lessons of the Gulf War Experience with Patriot," *International Security* 16 (Winter 1991/1992): 119–71.

13. Iraq fired 20 ballistic missiles in 2003, but only nine came within the Patriot's range and were intercepted. The rest, fortunately, fell in uninhabited areas. Anderson, "Air and Missile Defense," 46. See also *Testimony of Dennis M. Gormley, Senior Fellow, Monterey Institute's Center for Nonproliferation Studies, before the Subcommittee on National Security, Emerging Threats, and International Affairs of the U.S. House of Representatives*, 108th Cong., 2d sess., 9 March 2004, http://cns.miis.edu/research/congress/testim/testgorm.htm.

14. For a discussion, see David A. Fulghum, "Cruise Missile Battle," *Aviation Week and Space Technology*, 21 May 2004, 51–53.

15. Anderson, "Air and Missile Defense," 46; *Improvements Needed to Better Contest Technology Exports for Cruise Missiles and Unmanned Aerial Vehicles*, GAO Report 04-175 (Washington, DC: General Accounting Office, January 2004), 13; and Dennis M. Gormley, "The Neglected Dimension: Controlling Cruise Missile Proliferation," *Nonproliferation Review* 9 (Summer 2002): 23. China is developing a new cruise missile with as-yet-undetermined capabilities. See "Chinese Developing New Antiship Cruise Missile," *Aviation Week and Space Technology*, 31 May 2004, 23.

16. An Internet search will turn up several aircraft kits and autopilot systems. Note that China's cruise and ballistic missiles have "satellite-aided" guidance systems for increased accuracy. Ironically, US-provided signals from the global positioning system could be used against it. Stephen J. Flanagan and Michael E. Marti, eds., *The People's Liberation Army and China in Transition* (Washington, DC: National Defense University Press, 2003), 23.

17. Alan Vick, *Snakes in the Eagle's Nest: A History of Ground Attacks on Air Bases* (Santa Monica, CA: RAND, 1995), 68. In Vietnam, more US aircraft were destroyed on the ground by guerillas than in air-to-air combat.

18. For a copy of the report, see Lt Gen James F. Record, *Independent Review of the Khobar Towers Bombing*, parts A and B (Tucson, AZ: Davis-Monthan AFB, 31 October 1996), http://www.au.af.mil/au/awc/awcgate/khobar/recordf.htm. To eliminate the threat from an 82 mm mortar, for example, one needs a defensive perimeter with a radius of four miles. Sidoti, *Air Base Operability*, 115.

19. David A. Shlapak and Alan Vick, *"Check Six Begins on the Ground": Responding to the Evolving Ground Threat to U.S. Air Force Bases* (Santa Monica, CA: RAND, 1995), 41.

20. The Air Service had experimented with air refueling since the 1920s but found it impractical for the huge air fleets of World War II. With the onset of the Cold War, the concept took on added importance as air planners needed to ensure that bombers could hit targets deep in the Soviet Union. Air refueling was essential. Because far

fewer bombers were necessary in the age of nuclear weapons, air refueling became more practical. Richard K. Smith, *Seventy-Five Years of Inflight Refueling: Highlights, 1923–1998* (Washington, DC: Air Force History and Museums Program, 1998).

21. The C-17 has been fitted with passive defenses to ward off heat-seeking SAMs that it might encounter during takeoff and landing from forward bases. Because tankers generally do not operate in such locations, they do not have even this limited capability. Robert Wall, "The Next Step," *Aviation Week and Space Technology*, 23 August 2004, 58.

22. Kenneth P. Werrell, *Archie, Flak, AAA, and SAM: A Short Operational History of Ground-Based Air Defense* (Maxwell AFB, AL: Air University Press, 1988), 177.

23. William T. Y'Blood, *MiG Alley: The Fight for Air Superiority* (Washington, DC: Air Force History and Museums Program, 2000), 43; and Wayne Thompson, *To Hanoi and Back: The U.S. Air Force and North Vietnam, 1966–1973* (Washington, DC: Smithsonian Institution Press, 2000), 311.

24. James C. O'Halloran, *Jane's Land-Based Air Defence, 2004–2005* (Surrey, United Kingdom: Jane's Information Group, 2004), 157.

25. John A. Tirpak, "The Double-Digit SAMs," *Air Force Magazine* 84, no. 6 (June 2001): 48–49, http://www.afa.org/magazine/june2001/0601SAMS.pdf.

26. See Dr. Benjamin C. Lambeth, "Kosovo and the Continuing SEAD Challenge," *Aerospace Power Journal* 16, no. 2 (Summer 2002): 8–21, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj02/sum02/sum02.pdf.

27. Bowie, *Anti-Access Threat*, 13.

28. *Jane's All the World's Aircraft* reports the combat radii and payloads of US fighter aircraft as follows: F-16: 780 miles with two tons; F-15E: 790 miles with 12 tons; F-18E/F: 1,087 miles with two SLAM-ER missiles (one ton); and F-35: 690 miles with two tons. The official US Air Force Web site does not list the range of the F-22, but unofficial sources state that it will fall in the F-35 category. The F-22 can carry one ton of air-to-ground ordnance. All of these aircraft can also carry air-to-air missiles. Paul Jackson, ed., *Jane's All the World's Aircraft, 2003–2004* (Surrey, United Kingdom: Jane's Information Group, 2003), 548–671. The F-35 and F-22 could carry external fuel tanks, but doing so would degrade their stealthy characteristics as well as inhibit their maneuverability.

29. One F-15C pilot commented to me that "if a C-model gets into a full-up fight, has to drop all three of its fuel tanks, and turns several times, it could find itself bingo fuel in just a very few minutes."

30. Lockheed Martin has begun research on a standoff cruise missile that is not only stealthy but also small enough to fit inside the new stealth fighters. "Lockheed Martin Develops Smaller Standoff Cruise Missiles," *Aerospace Daily and Defense Report*, 21 July 2004, 1.

31. Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey*: *Summary Report* (Washington, DC: Government Printing Office, 1993), 15; and Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey*, vol. 5, *A Statistical Compendium and Chronology*, by Lewis D. Hill (Washington, DC: Government Printing Office, 1993), 232–33.

32. Benjamin S. Lambeth, *NATO's Air War for Kosovo: A Strategic and Operational Assessment* (Santa Monica, CA: RAND, 2001), 63, 87, 91.

33. David A. Fulghum and Robert Wall, "Heavy Bomber Attacks Dominate Afghan War," *Aviation Week and Space Technology*, 3 December 2001, 22; and "Operation Enduring Freedom: The Air Campaign," efreedomnews.com, 12 January 2003.

34. William M. Arkin, "U.S. Military Ain't Broke Yet," *Los Angeles Times*, 27 April 2003, M1.

35. David L. Emonson and Rodger D. Vanderbeek, "The Use of Amphetamines in U.S. Air Force Tactical Operations during Desert Shield and Storm," *Aviation, Space, and Environmental Medicine* 66 (March 1995): 260–63.

36. Darlene Schultz and James C. Miller, "Fatigue and Use of Go/No-Go Pills in Extraordinarily Long Combat Sorties," *Aviation, Space, and Environmental Medicine* 75 (April 2004): 370–71; and Alain Buguet, Dianne E. Moroz, and Manny W. Radomski, "Modafinil: Medical Considerations for Use in Sustained Operations," *Aviation, Space, and Environmental Medicine* 74 (June 2003): 659.

37. For the official US Central Command report acknowledging that the pilot was prescribed go/no-go pills, see http://www.centcom.mil/CENTCOMNews/Reports/Tarnak_Farms_Report.htm (accessed April 2006). For the Web site originated to plead the pilot's case, see http://www.harryschmidt.org (accessed April 2006).

38. Bowie notes that only 18 percent of the world's air bases usable by US fighter aircraft (runways 6,000 feet long and 145 feet wide) are located in Asia. *Anti-Access Threat*, 71. RAND says that the minimum runway length for fighter operations is 7,500 feet and 12,000 feet for large aircraft such as tankers. If one uses these criteria, even fewer airfields would be available. If large aircraft reduced their fuel load, they could use shorter runways, but this would reduce their endurance. Shlapak et al., *Global Access Strategy*, 49.

39. The distance from Diego Garcia to Baghdad is 3,342 miles; Diego to Tehran 3,260 miles; and Diego to Kabul 2,888 miles.

40. For how distance from base to target reduces sortie rates, see William D. O'Malley, *Evaluating Possible Airfield Deployment Options: Middle East Contingencies* (Santa Monica, CA: RAND, 2001).

41. Rebecca Grant, *The B-2 Goes to War* (Arlington, VA: Iris Press, 2001), passim.

42. Northrop Grumman Corporation is exploring the idea of turning its high-altitude Global Hawk UAV into a tanker. Although the aircraft would not be stealthy, the conversion would at least remove the risk to the aircrew in a high-threat environment. See the image in *Aviation Week and Space Technology*, 5 March 2007, 19.

Editorial Abstract: Today's standard weather support lacks a description of forecast uncertainty, thus limiting the forecast's utility. However, significant scientific and technological advances now make it possible to overcome that limitation by applying weather-forecast uncertainty information to the Air Force's decision-making process. The authors employ cost-effective ensemble forecasting in two different scenarios to demonstrate how principles of operational risk management can yield marked improvements in combat capability (effectiveness) and conservation of resources (efficiency).

Weather and the Calculated Risk

Exploiting Forecast Uncertainty for Operational Risk Management

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AIR FORCE SMART Operations 21 (AFSO21) has prompted a fresh look at ways to improve combat capability, including enhancing the decision-making process.[1] Highly effective and efficient operations require optimal decision making in situations that involve risk of unfavorable outcomes. Such risk exists due to uncertainty in decision inputs. Operators routinely face a variety of inexact inputs, such as intelligence reports on enemy strength, projections on available logistics, and performance

of weapon systems. This article explains how the uncertainty in one such decision input—the weather forecast—can be used within the principles of operational risk management (ORM) to improve combat capability by applying a new advancement called "ensemble forecasting."

Typically, Department of Defense (DOD) missions with weather vulnerabilities consider a single weather forecast, thus largely ignoring forecast uncertainty, which can often prove significant. Focusing attention on a single forecast leads to nonoptimal decisions.[2] Failure to consider an objective description of the potential forecast error leaves an operator overly vulnerable to costly mistakes and the wasting of resources—a situation analogous to betting on a horse race without considering each horse's projected odds of winning.

Clearly, the absolute best information for weather-related decisions would indeed be a consistently perfect *deterministic* forecast (i.e., a single-valued prediction for a weather phenomenon). Unfortunately, deterministic forecasting is anything but perfect. Forecast skill varies greatly due to the challenge of predicting the incredibly complex atmospheric system that contains nonlinear hydrodynamic, thermodynamic, radiation, chemical, and physical interactions. In fact, it is incredible that we can predict the atmosphere at all.[3]

The inherent uncertainty of the weather can be described with a "stochastic forecast," which expresses a distribution or range of possibilities that defines the potential error in the deterministic forecast and that can come in many different forms and from many different sources. For example, weather climatology (i.e., seasonal conditions) is normally given stochastically, such as the average, minimum, and maximum monthly expected rainfall at a location.

The idea of including uncertainty as part of a forecast is nothing new.[4] People recognized the potential value for applying stochastic forecasts within Air Force operations as early as the 1960s, but we have yet to capitalize upon it.[5] Today's forecasting remains primarily deterministic because (1) application of deterministic weather for decision making is straightforward, (2) benefits from and methods of applying stochastic forecasts are not widely understood, and (3) production of robust stochastic forecasts for short-term forecasts (up to a few days) has not been practical or affordable. However, since advancements in science and technology currently support production of stochastic forecasts, now is the time for the Air Force to learn and pursue the advantages of this technique.

Production and Application of Stochastic Forecasts

The primary tool for meteorologists for the past 40 years has been computer-based, numerical weather prediction (NWP) modeling. Weather observations are analyzed and then fed into a complex algorithm that simulates atmospheric behavior over time to generate a single, modeled forecast that has a varying degree of accuracy. NWP models, run at meteorological prediction centers, cover domains of various size (from city to global), resolution (from a few kilometers to hundreds of kilometers), and lengths of time into the future (from a few hours to weeks) to meet specific needs.

Producing just one deterministic (single solution) forecast in an NWP model requires performing trillions of calculations very quickly to process the data in time to be useful. This production involves extremely powerful, expensive supercomputers. A typical operational NWP model uses computer hardware worth about $100,000 to $1,000,000, depending upon the model configuration (domain size/resolution, run-time requirements, etc.).

Computers have now advanced to the point that running NWP models in a stochastic (multisolution) mode, using ensemble forecasting, has become cost-effective. In this type of forecasting, the NWP uncertainty is quantified by running the model many times (typically 20–30 individual solutions), with slight changes to the information fed to each model run as well as adjustments to the model's inner workings. This generates a spectrum of forecasts in which each forecast is a valid pos-

sibility; together, they yield an objective, stochastic weather forecast.

Additional processing to generate an ensemble forecast requires roughly an order of magnitude (10 times) more computer power, with an equivalently higher cost, compared to deterministic NWP. This article takes a DOD perspective on how the benefits of using ensemble forecasts greatly exceed the cost of their production. Across the weather-support community, the benefits for improving users' decision making have fueled extensive research and development over the past 20 years. Meteorological prediction centers worldwide are currently generating ensemble-based stochastic forecasts for their customers:

Center	*Year That Ensemble Forecasting Began*
US National Centers for Environmental Prediction	1992
European Center for Medium-Range Weather Forecasting	1992
US Navy Fleet Numerical Meteorology and Oceanography Center	1995
Canadian Meteorological Center	1996
China Meteorological Agency	1996
Bureau of Meteorology, Australia	2000
Japanese Meteorological Agency	2001
Korean Meteorological Administration	2001
United Kingdom Met Office	2007

Although the Air Force can and does leverage forecast data from outside sources, it must also generate tailored, mission-specific forecasts. Air Force Weather has committed itself to developing an ensemble-forecast capability. Brig Gen Lawrence A. Stutzriem, the former Air Force director of weather, stated that "ensemble forecast products and applications are the future of Air Force weather operations."[6] To that end, Air Force Weather is currently processing ensemble-forecast data in a prototype system and performing an extensive field test to learn how best to apply stochastic forecasts for enhancing DOD operations. This effort will last through 2008 and pave the way for operational implementation.

ORM serves as the conduit for applying stochastic forecasts since its guiding principle is "accept risk when benefits outweigh the costs."[7] Costs encompass necessities for carrying out the mission (supplies, equipment maintenance, training, etc.) while risk analysis involves understanding the uncertainty of each decision input. This principle can be met objectively, rather than subjectively, through decision theory, which bases decisions on mathematical evaluation in order to enable actions that maximize gain and/or minimize loss in the long run.[8] Essentially, decision theory is the literal realization of the expression "calculated risk." For example, assume that analysis of a business case shows long-term savings in applying expensive runway anti-icing chemicals if the chance of snow is greater than 35 percent.[9] Given a forecast of 25 percent chance of snow, the decision would be not to use the chemicals and accept the risk of more expensive, time-consuming plowing. That decision process is fundamentally different, and more effective over time, compared to using an imperfect, deterministic snow prediction as decision input.

It is possible to minimize losses and maximize gains simultaneously, but decision making often focuses on one or the other. In this article, the term *defensive ORM* refers to optimization with respect to minimizing loss, and *offensive ORM* refers to maximizing gains. We present examples for each type of ORM to demonstrate how application of stochastic forecasts meets the goals of AFSO21. The examples involve computerized modeling and simulation scenarios designed with enough realism to give them credibility while remaining simple enough to fit within the scope of this article. These simulations enable thorough exploration of potential benefits through variation and replay of the scenarios—something not possible in real-life examples.

Currently, actual examples within the DOD of successful application of stochastic forecasts are few and far between. A couple of notable exceptions include probabilistic storm prediction for launch operations at Patrick AFB, Flor-

ida, and inclusion of typhoon-track uncertainty from the Joint Typhoon Warning Center, Naval Base Pearl Harbor, Hawaii. There are also many success stories in the civilian sector. For example, California utilities realized a 9.5 percent increase in annual hydroelectric revenue and a 40 percent reduction in wasteful spillage from reservoirs when they switched to using stochastic forecasts.[10] Similar improvements are possible within DOD operations.

Example of Defensive Operational Risk Management

Defensive ORM involves making smart decisions that ensure the job gets done with the least expense. This could mean anything from resource protection for the avoidance of costly damage to conservation of logistics (ammunition, fuel, etc.). For purposes of demonstration, an Evacuation Simulation (Evac Sim) was constructed to model protection of a high-valued aircraft parked at an air base prone to high winds from typhoons.

Each year, on average, four typhoons approach the air base (within 200 miles). Usually one in four (one per year) results in surface winds greater than or equal to 50 knots at the base, which can cause significant and costly ($1,000,000 in this simulation) damage to aircraft. Using the weather forecast, the aircraft operator needs a two-day lead time to decide whether to evacuate (costing $150,000 for fuel, the crew's travel vouchers, etc.) to an alternative operating location before the typhoon hits. The two choices (evacuate or remain in place) and two possibilities for the wind (greater than or equal to, or less than 50 knots) produce four possible outcomes for any typhoon approach (associated expense in parentheses):

1. Valid Evacuation ($150,000): evacuated; damaging wind avoided.
2. Savings ($0): remained in place; damaging wind did not occur.
3. False Alarm ($150,000): evacuated; damaging wind did not occur.
4. Loss ($1,000,000): remained in place; damaging wind occurred.

The Evac Sim generates wind conditions at the base for each typhoon through random draws from a distribution of possible conditions constructed to represent realistic climatologic conditions.[11] Simulated deterministic (single-valued) forecasts result from adding an unbiased random error onto the true wind with average magnitude of 12 knots—a conservative estimate for two-day forecast error in high-wind situations. The deterministic forecast thus mimics real-world forecasts by always being in the neighborhood of the truth—sometimes very close and sometimes highly erred. The simulated stochastic forecasts are produced through a statistical calculation that considers where the threshold of 50 knots falls within a distribution of potential forecasts (based on the error range of the deterministic forecast). The simulation process mimics a real-world, imperfect ensemble forecast by using an incorrect estimate of forecast error when constructing the ensemble distribution.[12]

Table 1 shows sample results of the Evac Sim for decisions made and expenses incurred by an operator supported by deterministic versus stochastic forecasts for the same typhoon approaches. The deterministic operator evacuates when the forecast is for wind greater than or equal to 50 knots. The stochastic operator evacuates when the probability forecast for wind greater than or equal to 50 knots is 15 percent or higher. This percentage represents the optimal decision threshold defined by the cost of protecting divided by the loss if the damage occurs, known as the cost/loss ratio in decision theory.[13]

Examination of a single case in table 1, such as typhoon number two, shows that the deterministic operator can occasionally make the better decision. It is only in the long run that the benefit of applying decision theory is realized. By the end of two years (or eight typhoon approaches), the stochastic operator is clearly doing better. As the Evac Sim continues, the savings of the stochastic operator (the difference between the deterministic and stochastic expenses) grow (fig. 1). However, the

Table 1. Sample results of Evac Sim*

Typhoon Approach	**Deterministic Operator** (Decision Threshold = 50 knots)				
	Forecast Wind (knots)	Evacuate?	Observed Wind (knots)	Result	Cumulative Expense ($1,000)
1	12	no	20	savings	0
2	36	no	44	savings	0
3	77	yes	**81**	valid evacuation	150
4	43	no	**62**	**loss**	1,150
5	52	yes	41	**false alarm**	1,300
6	28	no	29	savings	1,300
7	20	no	27	savings	1,300
8	32	no	23	savings	1,300

Typhoon Approach	**Stochastic Operator** (Decision Threshold = 15 percent)				
	Forecast Wind greater than or equal to 50 knots (percent)	Evacuate?	Observed Wind (knots)	Result	Cumulative Expense ($1,000)
1	9	no	20	savings	0
2	17	yes	44	**false alarm**	150
3	99	yes	**81**	valid evacuation	300
4	25	yes	**62**	valid evacuation	450
5	33	yes	41	**false alarm**	600
6	24	yes	29	**false alarm**	750
7	1	no	27	savings	750
8	7	no	23	savings	750

*The table shows deterministic- versus stochastic-operator evacuation decisions and expenses incurred for eight consecutive typhoon approaches over a two-year period. The deterministic operator's total expense amounted to $1,300,000—mostly from a costly miss on the fourth typhoon approach. The stochastic operator suffered from many false alarms (approaches two, five, and six) but correctly evacuated to avoid both damaging wind events (approaches three and four), thus expending $550,000 less.

stochastic operator makes plenty of wrong decisions, even including a $1,000,000 loss on typhoon approach number 27. Given the uncertainty in the forecast, the best possible performance is obtained by following ORM supported by stochastic forecasts. Repeated runs (multiple 10-year periods [results not shown]) of the simulation revealed that the average (or expected) 10-year expense comes to $5,400,000 for the deterministic operator and $3,800,000 for the stochastic operator (a 30 percent savings).

This simple yet revealing example of defensive ORM can be made more realistic by adding complexity, but that would not change the general result. For instance, resource-protection scenarios often involve a range of possible actions to choose from and multiple levels of potential loss. The simulation could be expanded to include less expensive options to protect the aircraft for wind conditions up to 60 knots, such as securing the aircraft in a hangar. Also, the damage (loss) may greatly increase if extremely high winds (more than 80 knots) occur. Representing such complexity in a decision model would only further support the case for using stochastic forecasts in an ORM decision process to maximize efficiency.[14]

The crux of applying decision theory entails accepting the fact that when decision inputs contain uncertainty, it is not possible to make the right decision consistently. Unfavorable outcomes (false alarms and/or losses) are bound to occur. The strategy involves aiming for perfection while simultaneously finding a balance of potential false alarms and losses that minimizes expenses over time. Such optimization becomes possible with robust, stochastic decision inputs, which an ensemble forecast can provide for weather.

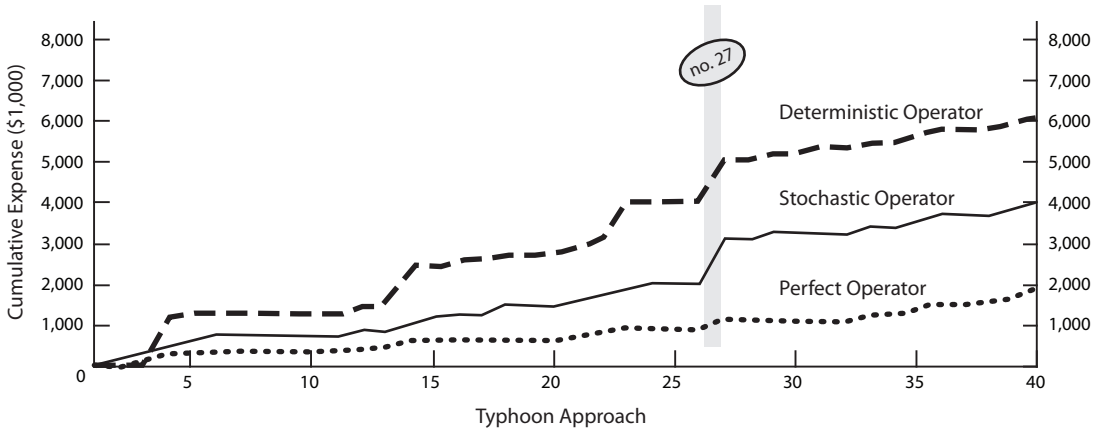


Figure 1. Sample results of the extended Evac Sim. Cumulative expenses are shown for 40 typhoon approaches over one 10-year period (including the first eight typhoons from table 1 for the deterministic operator, stochastic operator, and a hypothetical perfect operator who evacuates only for cases when a wind greater than or equal to 50 knots actually occurs). Typhoon approach number 27 is highlighted to show a case in which both the deterministic and stochastic operators failed to take necessary protective action. The stochastic operator saved about $2,000,000 in this sample 10-year period.

Example of Offensive Operational Risk Management

Offensive ORM has to do with making smart decisions to optimize gain. For DOD operations, this means maximizing combat capability (within resource limitations) to more effectively perform the mission. The example for this article involves destruction of enemy air defenses (DEAD [pronounced "deed"]).[15] In the following DEAD simulation (DEAD Sim), a four-ship flight of F-16s is tasked to reduce the enemy's surface-to-air missile (SAM) capability by executing a series of DEAD missions.

The objective calls for quickly and efficiently reducing the enemy's SAM capacity down to 10 percent, thus clearing the way for the start of the main air offensive. Campaign planners have allocated 630,000 pounds (lb.) of fuel for DEAD operations. A single mission uses 60,000 lb., so the aircraft need to fulfill the objective with no more than 10 missions to avoid tapping into fuel needed to support follow-on operations.

Visual contact with the targets is essential since the SAMs are mobile and not radar active. Additionally, rules of engagement for this campaign dictate strict attention to avoiding collateral damage. With the mobile SAMs often operating within small villages, the pilots can minimize damage to civilian interests only with eyes on target. Due to rough and varying terrain, sufficient visual contact and ground clearance become possible only when the cloud ceiling is 3,000 feet (flight level 030) or higher. Cloud ceiling (CIG) is defined as the height of the base of the lowest cloud layer that covers at least six-tenths of the sky.[16]

Similar to the Evac Sim, the DEAD Sim simulates varying weather conditions with random draws from a distribution of possible cloud states constructed to represent climatological conditions of CIG greater than or equal to 030 occurring approximately two-thirds of the time.[17] Deterministic forecasts are assumed to have an average random error of 900 feet. Stochastic forecasts from an ensemble are simulated from a slightly erred distribution of potential forecasts.[18]

The DEAD Sim steps through sequential cycles defined as the period of time (many hours) to plan, equip, execute, and recover. In deciding not to attack, the operator still uses up a cycle since the planning process, air-

crew preparation, and equipping must be restarted. Each successful attack mission reduces the SAMs by 20 percent of the enemy's maximum capacity. The enemy rebuilds by 5 percent during any cycle when not successfully attacked (but can never exceed 100 percent) and has a large resupply capability. Any given cycle has four possible outcomes (associated destruction [-] or rebuild [+] of enemy capacity as well as fuel expense in parentheses):

1. Success (-20 percent | 60,000 lb.): mission flown; found favorable weather.
2. No Opportunity (+5 percent | 0 lb.): mission not flown; unfavorable weather occurred.
3. Missed Opportunity (+5 percent | 0 lb.): mission not flown; favorable weather occurred.
4. Wasted Effort (+5 percent | 60,000 lb.): mission flown; found unfavorable weather.

The stochastic operator can use probability forecasts to make a quicker kill (table 2). The deterministic operator gets the job done but suffers from more frequent poor decisions. The stochastic operator, though vulnerable to mistaken decisions, is much better at capitalizing on opportunities. The advantage comes from attacking when probability for CIG greater than or equal to 030 exceeds the optimal threshold, recalculated prior to each cycle. The

Table 2. Sample results of DEAD Sim*

Cycle	**Deterministic Operator** (Decision Threshold = 030)					
	CIG Forecast	Attack?	CIG Observed	Result	Enemy SAM (percent)	Fuel Used (x1,000 lb.)
1	062	yes	068	success	80	60
2	045	yes	**014**	**wasted effort**	85	120
3	022	no	045	**missed opportunity**	90	120
4	048	yes	038	success	70	180
5	035	yes	035	success	50	240
6	017	no	042	**missed opportunity**	55	240
7	038	yes	**027**	**wasted effort**	60	300
8	005	no	**011**	no opportunity	65	300
9	016	no	**008**	no opportunity	70	300
10	066	yes	064	success	50	360
11	025	no	032	**missed opportunity**	55	360
12	033	yes	049	success	35	420
13	125	yes	115	success	15	480
14	085	yes	100	success	0	540

Cycle	**Stochastic Operator** (Decision Threshold = variable percentage)						
	Forecast CIG greater than or equal to 030 (percent)	Decision Threshold (percent)	Attack?	CIG Observed	Result	Enemy SAM (percent)	Fuel Used (x1,000 lb.)
1	100	45	yes	068	success	80	60
2	55	39	yes	**014**	**wasted effort**	85	120
3	42	47	no	045	**missed opportunity**	90	120
4	95	50	yes	038	success	70	180
5	88	43	yes	035	success	50	240
6	38	33	yes	042	success	30	300
7	64	20	yes	**027**	**wasted effort**	35	360
8	22	31	no	**011**	no opportunity	40	360
9	17	38	no	**008**	no opportunity	45	360
10	100	44	yes	064	success	25	420
11	31	25	yes	032	success	5	480

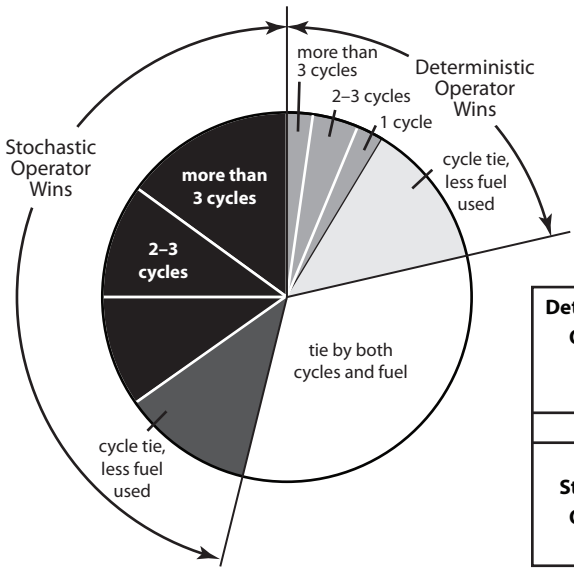
*Deterministic- versus stochastic-operator decisions and results for the same weather conditions are shown for one complete campaign. The deterministic operator needed three additional cycles and 60,000 lb. (or one mission) more fuel to complete the DEAD objective.

threshold is based on the changing situation of the enemy's remaining SAM capacity and remaining fuel.[19] Lower SAM capacity (weaker enemy) and greater fuel supply (stronger friendly footing) means the stochastic operator can afford to be more aggressive and attack at a lower probability of favorable weather.

Optimally meeting the DEAD objective requires balancing between being aggressive to rapidly defeat the SAMs and being cautious to avoid wasting fuel on unsuccessful missions. Simply attacking every cycle would ensure garnering every possible opportunity, thus meeting the DEAD objective the quickest. However, many of the missions would encounter unfavorable weather, thus maximizing fuel waste and potentially degrading capability for the remainder of the air campaign. The challenge then becomes defeating the SAMs as effectively (minimizing time taken) and efficiently (minimizing fuel usage) as possible.

Figure 2, built from repeated runs of the DEAD Sim, shows the advantage (particular to this example) an operator could expect by using stochastic forecasts to optimize decisions. The stochastic operator performed better more frequently and often by a large margin. The deterministic operator could sometimes beat or tie the stochastic operator since random chance resulted in some very good deterministic forecasts. The key downfall of the deterministic forecasts was that the good ones were not reliable. In essence, the deterministic operator became a victim of uncertainty since the amount of error can never be known ahead of time.

The overall average results had the stochastic operator improving by 10 percent over the deterministic operator (mission accomplished in 10.1 cycles versus 11.2 cycles). Furthermore, effectiveness improved without additional resources. On average, the stochastic operator actually used 3 percent less fuel. Although that may not represent a significant savings, remember that offensive ORM focuses on effectiveness and not efficiency, as with defensive ORM. Combat capability is maximized by applying knowledge of the full range of possibilities to the decision process, thus reacting to a comprehensive picture of potential effects on the mission from the natural environment. However, as also shown in the Evac Sim, the stochastic operator is certainly not perfect. A hypothetical perfect operator would meet the



Deterministic Operator Wins	**213**	Win by more than 3 cycles	23
		Win by 2–3 cycles	39
		Win by 1 cycle	24
		Cycle tie, less fuel used	127
Ties	**327**		327
Stochastic Operator Wins	**460**	Cycle tie, less fuel used	112
		Win by 1 cycle	102
		Win by 2–3 cycles	97
		Win by more than 3 cycles	149

Figure 2. Results from 1,000 separate campaigns run in the DEAD Sim

DEAD objective with 20 percent fewer cycles and 20 percent less fuel on average.[20] At best, a real-life operator can come closer to perfection by accounting for the inherent uncertainty of the forecast.

Many possibilities exist for expanding the scope and realism of the DEAD Sim. Instead of just monitoring fuel usage, other critical dependencies such as ordnance, pilot availability, and so forth, could also be tracked. Missions that met unfavorable weather for the DEAD operation could be directed to secondary targets. Instead of fixing SAM destruction at 20 percent for a successful mission, destruction could vary, based on an operator's choice to alter the number of sorties per mission or on an enemy who effectively hides during fair weather. Adding such enhancements would be telling for war-gaming analysis, but the bottom line would still be that using stochastic forecasts in an offensive ORM decision process maximizes combat capability.

Human Factors

Optimal ORM decision making comes from balancing mission risks and mission objectives. In the decision-model examples above, risks and objectives are well defined, and decisions follow prescribed optimization rules. These models have applicability when decision inputs and their risks are quantifiable and decision rules can be clearly defined a priori. This is the case with decision inputs such as logistics, enemy strength, weather, weapons' impact, and so forth, and with clear mission objectives such as minimizing expenses or eliminating enemy capabilities.

The role of machines in decision making is steadily increasing as the machine-to-machine environment matures. Since machines operate only as programmed, they are ideal for performing a balanced risk analysis in a prescriptive scenario. A machine rapidly processes extensive, complex data from a myriad of quantifiable inputs and strictly follows optimization rules to arrive at an appropriate decision. The weakness of the machine decision is that it may make nonoptimal decisions in situations involving intangible decision inputs.

The latter inputs include issues such as unit morale and political, strategic, moral, and religious considerations. At best, defining and understanding these often powerful influences on mission accomplishment can normally be done subjectively. A human decision maker must weigh the associated risks against costs and mission objectives. In the DEAD scenario, for example, assume that several days of unfavorable weather have prevented any attempt to attack. Morale is dropping rapidly as personnel become anxious to perform their duty. Given yet another forecast for potential unfavorable weather (exceeding risk tolerance), the operator may decide to risk an attack to bolster morale and greatly increase the chances of overall success.

The human ability to process intangible decision inputs can add tremendous value to the decision process. Unfortunately, regardless of whether a situation involves quantifiable, intangible, or both types of decision inputs, humans can sometimes make nonoptimal decisions through unbalanced risk analysis.[21] Unlike machines, humans may occasionally choose to ignore optimization rules. For example, in the typhoon scenario, a decision maker concerned that incurring a big loss may ruin his or her career may choose to evacuate even when the rule-based decision calls for remaining in place.

Humans also tend to have an overly narrow focus. Faced with a complex array of both quantifiable and intangible inputs, all with varying degrees of uncertainty, an operator can quickly become overwhelmed. The logical reaction involves subjectively weighing the inputs and making a decision considering only the most important factors. Although a very experienced operator may successfully arrive at a valid decision, more often than not, the narrow-focus effect leads to nonoptimized decisions.

Misinterpretation of quantified stochastic inputs also represents a potential problem. Inability to think stochastically can sway a decision maker away from following the optimization rules. Humans tend to think deterministically (yes/no) and translate any probability

greater than 50 percent into "it's going to happen" and vice versa. Additionally, different methods of presenting risk information can result in different decisions since human information processing involves both experiential (i.e., emotional) and analytic aspects.[22] Consider how a decision maker may react to numerically equivalent forecasts of "70 percent chance of snow" versus "30 percent chance of no snow" versus "odds of snow are seven in 10."

In another common behavior—the "knee-jerk" reaction—decisions are based upon a recent unfavorable outcome. When an operator gets hit with the bill from a loss or wasted effort, the natural reaction is to toss aside (maybe only temporarily) the optimized decision rules and do whatever it takes to ensure that bill doesn't come again. Ironically, such shortsightedness ends up costing more in the long run. The real flaw lies in using a single unfavorable (or favorable) outcome as a measure of ORM success.

The knee-jerk reaction was modeled in the DEAD Sim to demonstrate its impact. After wasting effort (flying a mission and finding unfavorable weather), the stochastic operator increased the decision threshold to 99 percent chance of CIG greater than or equal to 030 for the next cycle to prevent another wasted effort (the operator did not attack unless favorable weather became very certain). Conversely, upon missing an opportunity (not flying a mission and favorable weather occurring), the stochastic operator decreased the decision threshold for the next cycle to 1 percent to prevent another missed opportunity (the operator attacked unless unfavorable weather was certain). This knee-jerk reaction produced an increase in average number of cycles to 10.7 (from 10.2) and in average fuel use to 415,000 lb. (from 398,000). This performance was still better than the deterministic operator's but a notable departure from optimal.

Summary/Recommendations

Two simple yet realistic decision scenarios were modeled to demonstrate how stochastic forecasts, which describe a range of likely outcomes, enable ORM. The Evac Sim showed how use of stochastic forecasts can significantly conserve resources (i.e., increased *efficiency* through defensive ORM). The DEAD Sim showed how use of stochastic forecasts can maximize combat capability (i.e., increased *effectiveness* through offensive ORM). The added benefit from using stochastic versus deterministic (single-valued) forecasts can vary greatly, depending upon a mission's sensitivity to weather, the skill of the deterministic forecasting, and the detrimental weather's frequency of occurrence. Additionally, human factors can have both positive and negative effects on the decision process.

Realizing the benefits will require considerable resources, effort, and patience in the development arenas of ensemble-data production and application. The effort would enhance one of our country's great strengths—advanced technology. Skilled use of stochastic forecasts from an ensemble system can provide a distinct advantage over an adversary in current and future conflicts. Alternatively, continuing with decision making based on deterministic forecasts may leave the DOD at a disadvantage, given increasing interest worldwide in stochastic forecasts, as mentioned earlier.

The DOD can and should exploit stochastic weather information available from external sources (e.g., the National Weather Service), but internal production of ensemble data is necessary to tailor forecasts to war fighters' requirements. For example, generating a reliable probability forecast for a high-impact event such as a dust storm at Balad Air Base, Iraq, requires processing a fine-scale ensemble forecast to model the event. Such production is expensive but cost-effective. An ensemble system designed for a typical theater of operation (e.g., the Middle East) costs several million dollars in today's computer hardware. The Evac Sim used rather conservative estimates to show how millions of dollars can be saved through optimal protection of a single aircraft. By multiplying that across all aircraft and DOD assets susceptible to adverse weather, including life-threatening conditions, and then adding in the increased combat capability for all missions with weather vulnera-

bilities, it quickly becomes obvious that returns far outweigh costs. The DOD should fully back Air Force Weather's planned implementation (beginning in 2009) of a robust ensemble system designed to deliver high-quality, operations-tailored stochastic forecasts for all theaters of operation.

Apart from the production of ensemble data, exploitation of this technology requires decision makers willing and able to apply it. Across the Air Force, personnel, procedures, and tools need to transform over the next few years to use stochastic forecasts in objective decision making. The first step in this transformation is education since appreciation of the benefits and skillful application require understanding. The DOD should incorporate ORM that uses stochastic forecasts into formal training for its decision makers at all levels. The next step entails analysis of weather-sensitive missions and processes to determine optimal decision thresholds (e.g., choosing an alternate air-refueling track if the chance of moderate turbulence is greater than or equal to 35 percent in the primary track). The operations-research community, which has an interest in enhancing DOD decision making, can help meet the scope and complexity of such an undertaking.[23]

Obviously much too involved to occur overnight, such transformation lends itself to a gradual approach. Users who already incorporate aspects of probability forecasting (e.g., launch operations at Patrick AFB) or have the most to gain (due to high sensitivity to weather) should target transition as early as 2009–10. Other users can follow suit when they are ready because deterministic forecasts will remain available.

The paradigm shift away from today's reliance on deterministic forecasts constitutes the main barrier to this transformation. Both deterministic and stochastic forecasts focus on helping users make good decisions, but the key difference lies in the handling of uncertainty. Deterministic forecasts are fundamentally limited by inconsistent forecast errors (unknown uncertainty). Stochastic forecasts provide an objective description of uncertainty to support optimal decision making following ORM principles: accept mission risks only when potential benefits outweigh costs and potential loss. Realizing this vision will enable war fighters to exploit forecast uncertainty instead of becoming its victim—and thus will promote the objectives of AFSO21. ❑

Notes

1. Hon. Michael W. Wynne, secretary of the Air Force, "Letter to Airmen: Air Force Smart Operations 21," 8 March 2006, http://www.af.mil/shared/media/document/AFD-070205-087.pdf.

2. Roger A. Pielke Jr. and Richard T. Conant, "Best Practices in Prediction for Decision-Making: Lessons from the Atmospheric and Earth Sciences," *Ecology* 84, no. 6 (2003): 1351–58, http://sciencepolicy.colorado.edu/admin/publication_files/2003.22.pdf.

3. Edward N. Lorenz, *The Essence of Chaos* (Seattle, WA: University of Washington Press, 1993), 77–79.

4. Allan H. Murphy, "The Early History of Probability Forecasts: Some Extensions and Clarifications," *Weather and Forecasting* 13, no. 1 (March 1998): 5–15, http://ams.allenpress.com/archive/1520-0434/13/1/pdf/i1520-0434-13-1-5.pdf.

5. Maj Frank P. Scruggs Jr., "Decision Theory and Weather Forecasts: A Union with Promise," *Air University Review* 18, no. 5 (July–August 1967): 53–57, http://www.airpower.maxwell.af.mil/airchronicles/aureview/1967/jul-aug/scruggs.html.

6. Brig Gen Lawrence A. Stutzriem, director of weather, to commander, Air Force Weather Agency, memorandum, 4 October 2006.

7. Air Force Instruction (AFI) 90-901, *Operational Risk Management*, 1 April 2000, 2, http://www.e-publishing.af.mil/pubfiles/af/90/afi90-901/afi90-901.pdf.

8. Yuejian Zhu et al., "The Economic Value of Ensemble-Based Weather Forecasts," *Bulletin of the American Meteorological Society* 83, no. 1 (January 2002): 73–83, http://ams.allenpress.com/archive/1520-0477/83/1/pdf/i1520-0477-83-1-73.pdf.

9. In general, an optimal probability decision threshold for when to take action can mathematically be found by considering things such as cost of taking action, potential loss if the event occurs without protection, or gain missed by not taking action. In the simple example here, the decision threshold of 35 percent would have come

from dividing the cost of the anti-icing chemicals by the cost of plowing.

10. National Research Council Committee on Estimating and Communicating Uncertainty in Weather and Climate Forecasts, *Completing the Forecast: Characterizing and Communicating Uncertainty for Better Decisions Using Weather and Climate Forecasts* (Washington, DC: National Academies Press, 2006), 20, http://www.nap.edu/catalog/11699.html.

11. Climatologic typhoon wind conditions are represented with a gamma distribution (see Jay L. Devore, *Probability and Statistics for Engineering and the Sciences*, 4th ed. [Belmont, CA: Wadsworth Publishing Company, 1995], 167–69) with gamma parameters $\alpha = 3.8$ and $\beta = 10.3$, chosen to represent a realistic spectrum of possible typhoon winds in a tropical, coastal environment. For each typhoon, the true (observed) wind at the base is a random draw from a smaller distribution having a mean drawn from the full climatological distribution and an average standard deviation of 12 knots to match the average deterministic-forecast error.

12. The probability of getting wind greater than or equal to 50 knots in the Evac Sim is calculated as the $1 - p$ value (where p is the cumulative area under the distribution) from the same distribution from which the truth was drawn, except with an added average mean error of 1.5 knots and an average standard-deviation error of -10 percent.

13. Using other than the optimal decision threshold (15 percent cost/loss ratio in the Evac Sim) results in lower performance. A stochastic operator wanting to completely avoid expensive losses would choose to evacuate even at very low probability of damaging wind, resulting in too many false alarms and an average 58 percent higher overall expense in the Evac Sim. Conversely, following an arbitrary decision threshold of 50 percent chance of damaging wind would result in many more losses and an average 32 percent higher overall expense.

14. Allan H. Murphy, "Decision Making and the Value of Forecasts in a Generalized Model of the Cost-Loss Ratio Situation," *Monthly Weather Review* 113, no. 3 (March 1985): 362–69, http://ams.allenpress.com/archive/1520-0493/113/3/pdf/i1520-0493-113-3-362.pdf.

15. This is similar to suppression of enemy air defense (SEAD) missions, the difference being that DEAD missions seek to destroy enemy air defenses instead of just inhibit them.

16. American Meteorological Society, *Glossary of Meteorology*, http://amsglossary.allenpress.com/glossary (accessed 11 November 2006).

17. Climatologic CIG conditions (in hundreds of feet) are represented with a gamma distribution with parameters $\alpha = 2.7$ and $\beta = 15.2$ (see note 11), chosen to represent a realistic spectrum of possible CIG conditions in a midlatitude, mountainous environment. For each cycle, the true (observed) CIG is a random draw from a smaller distribution having a mean drawn from the full range of climatological distribution and an average of 900 feet to match the average deterministic-forecast error.

18. The probability of getting CIG greater than or equal to 030 in the DEAD Sim is calculated as the $1 - p$ value (where p is the cumulative area under the distribution) from the same distribution from which the truth was drawn, except with an added average mean error of 150 feet and an average standard deviation error of -10 percent.

19. The optimal stochastic decision threshold (T) is found by

$$T = \frac{(S_{\%} - O_{\%})F_m}{D_{\%}\,F_r}$$

where $S_{\%}$ is the current capacity of enemy SAMs as a percent of total possible capacity, $O_{\%}$ is the objective percent SAM capacity to which the enemy must be reduced, F_m is the fuel expended per mission, $D_{\%}$ is the percent of SAMs destroyed on a successful mission, and F_r is the amount of fuel remaining.

20. The perfect operator's average number of cycles (P) to meet the DEAD objective (i.e., missions flown during every occurrence of favorable weather) is found by

$$P = \left[\frac{100\% - O_{\%}}{D_{\%}}\right]\left[1 + \left(\frac{R_{\%}}{D_{\%}}\right)\sum_{n=1}^{N} C^n\right]$$

where $O_{\%}$ is the objective percent of SAM capacity to which the enemy must be reduced, $D_{\%}$ is the percent of SAMs destroyed on a successful sortie, $R_{\%}$ is the enemy's SAM rebuild rate for a cycle without a successful mission, C is the climatological rate of occurrence of unfavorable weather, and N is the length of the exponential series.

21. National Research Council Committee, *Completing the Forecast*, 33–44.

22. Ibid., 34.

23. Military Operations Research Society, "The World of MORS: Growing Analysts, Expanding Toolsets, Improving Analysis," *Phalanx* 39, no. 3 (2006): 3.

Integrating Weather in Net-Centric Warfare

A Case for Refocusing Human Resources in Air Force Weather

Col Scot T. Heckman, USAF

Editorial Abstract: Dwindling manpower in Air Force Weather (AFW) and an increasingly net-centric Air Force are forcing a change from the days of the face-to-face weather briefing. Furthermore, the Air Force needs a better degree of forecast consistency. The author proposes that automated forecasts and forecast tailoring represent significant changes for AFW but that their implementation will remove potential human bottlenecks, enable greater detail for decision makers, and increase the speed of access for all users.

THE WEATHER BRIEFER is obsolete, a victim of net-centricity. In a world where everyone is connected, people affected by weather will access related information directly and integrate it into their decision processes. No longer will "Stormy" the weather briefer, acting as both an expert and a bottleneck, serve as gatekeeper to weather databases. To remain relevant to net-centric operations, Air Force Weather (AFW) must aggressively develop support for net-centric access and redefine the role of the weather briefer. Specifically, if it wishes to meet the demands of increasingly net-centric decision makers, despite a shrinking manpower pool, AFW must automate the forecast-tailoring pro-

cess, remove the weather briefer, and address inconsistency in the weather database.

Background

Understanding the interaction between netcentricity and AFW operations requires some awareness of the fundamental concepts of each. According to *The Implementation of Network-Centric Warfare*, "NCW [network-centric warfare] is characterized by the ability of geographically dispersed forces to attain a high level of shared battlespace awareness that is exploited to achieve strategic, operational, and tactical objectives in accordance with the commander's intent."[1] Increased sharing of information via the network at all levels of command likely will result in massed effects (increased combat power), decision superiority, heightened speed of command, and self-synchronization.[2] As described in the *Net-Centric Environment Joint Functional Concept*, when connected, units can pursue a commander's intent without repeated contact with superiors to synchronize operations, relying on shared awareness based on consistent information to self-synchronize.[3]

The *Transformation Planning Guidance* of 2003 specifically states that "implementation of the Department's force transformation strategy will shift us from an industrial age to an information age military. Information age military forces will be less platform-centric and more network-centric."[4] NCW will increase connectivity at lower echelons of command and throughout functions other than command and control (C2). The *Net-Centric Environment Joint Functional Concept* notes that "since C2 nodes are already fairly well connected, the real power of the Net-Centric Environment will be in connecting the other functions and extremities of the force."[5]

The Office of Force Transformation monitors the progress of the transformation effort. The *Transformation Planning Guidance* directs each of the services to write a road map that addresses, among other things, its conversion to NCW. Service NCW programs include the Joint Tactical Radio System, Air Force Link-16 airborne data link, Department of Defense (DOD)–wide Global Information Grid network-infrastructure program, Navy Cooperative Engagement Capability data link, and Army Force XXI Battle Command Brigade and Below data-link system.[6]

In addition, looking to improve their forces' shared situational awareness and collaborative decision making, the services are actively increasing the connectivity of their forces and experimenting with new tactics, techniques, and procedures to take advantage of the new capability.[7] Despite the newness of NCW technologies and procedures, success stories have emerged from Operation Iraqi Freedom. For example, data links and the Blue Force Tracker system have reduced incidents of fratricide, and procedures enabled by new data links have allowed the development and striking of targets within 45 minutes.[8]

Before discussing weather operations, we should define the term *decision maker* as used in this discussion. Specifically, such an individual receives weather information and takes action based on that information—a purposely broad denotation since the environment affects virtually every mission and function to some degree. Indeed, the substance of this article could affect anyone who has access to weather information.

For weather operations, Air Force Doctrine Document (AFDD) 2-9.1 *Weather Operations*, describes how "Air Force weather operations execute five core processes—collection, analysis, prediction, tailoring, and integration—to characterize the environment and exploit environmental information."[9] Such characterization includes collection of environmental measurements taken by the DOD, US government, and foreign instrumentation; analysis of the measurements; and prediction of the future state of the environment. These actions produce a four-dimensional representation (latitude, longitude, altitude, and time) of the environment, consisting of such environmental parameters as wind speed/direction, temperature, pressure, humidity, clouds, and precipitation. In order for military decision makers to exploit this information, we must derive such decision parameters as ceiling, visibility,

cloud-free line of sight, and thermal contrast from the environmental parameters, some of which (e.g., wind speed) double as decision parameters. We tailor forecasted decision parameters to a particular mission by retrieving them for the time(s) and location(s) needed, packaging the information into usable form (maps, tables, graphs, etc.), and formatting the result for integration into the decision maker's decision process. If the decision maker provides operational limitations (i.e., thresholds), we may highlight these in the final product. We then measure or generate weather data and provide decision makers weather information in the form of a product—a collection of information in a particular package (text, map, or graph) and format (file type). In the future, we anticipate that net-centric data management and services will make the processing and communication of a tremendous amount of information feasible and timely.

Weather information made available to decision makers must be accurate, timely, relevant, consistent, and accessible. Accurate information facilitates correct decisions more often than incorrect ones. Timely information prevents delayed decisions. Relevant information allows the decision maker to pinpoint pertinent data. Consistent information guarantees that individuals involved in a collaborative decision process do not receive conflicting statements about the weather. And accessible information permits decision makers to find what they need in a usable form.

Trends

Increasing connectivity, net-centric decision making with its demand for consistency, and decreasing AFW manpower will reduce AFW's ability to support net-centric decision makers in the future unless it shifts resources from human-based forecast tailoring to a more automated approach.

Increasing Connectivity

NCW's network revolution will radically change communication modes, categorized here by the degree of network-interface usage. In this construct, machine communications require a network interface, but human communications do not. For example, machine-to-machine (M2M) communication involves one computer application automatically requesting information from another and the other automatically responding via the network. Human-to-human (H2H) communication does not require a network interface even though some voice communications will eventually take place over the network (e.g., Voice-over-Internet Protocol). Examples include a briefing to a commander and his staff, a telephone conversation between action officers, or ground troops passing target coordinates to aircraft over voice links. Machine-to-human (M2H) communication requires a network interface, as when a human uses a computer to access a Web page or query a database.

As decision makers at all echelons gain network access, the primary mode of communication for weather information will change from H2H to M2M and M2H. No longer the primary mode, voice communications will yield to network communication, which permits the transmission of detailed data. Freed from communications within line of sight or on certain frequencies, decision makers will have access to the entire network (via reachback). Major C2 nodes have traditionally possessed this kind of access, but the vision for NCW entails extending this kind of connectivity to the most tactical levels: the cockpit, tank, platoon member, and so forth. Decision makers who have experienced difficulty accessing weather information in the past, due to limitations in communications or AFW personnel resources, will demand access—and the number of decision makers served will rise.

Increasing Demand for Consistency

Self-synchronization based on shared awareness puts a premium on consistency of information.[10] Contradictory information frustrates attempts to collaborate and self-synchronize since collaborators must resolve conflicts before working on the tactical decision at hand.

All decision makers in an operations area must get their weather information from a consistent and authoritative source to prevent disruption of coordinated operations. To cite a simple example, a fighter mission launches, expecting marginal conditions in a refueling track, but the tanker cancels since its information shows conditions out of (the tanker's) limits. Although this scenario is manageable, imagine decision makers involved in a complex joint and/or coalition operation attempting to plan their part of the overall operation and trying to avoid or mitigate the effects of weather. One of the four principles of AFW operations, consistency serves as the basis of the call for "one theater, one forecast," found in Joint Publication 3-59, *Joint Doctrine, Tactics, Techniques, and Procedures for Meteorological and Oceanographic Operations.*[11]

Decreasing Air Force Weather Manpower

Recent budget uncertainty caused by the ongoing global war on terror, the *Quadrennial Defense Review Report* of 2005, and former secretary of defense Donald Rumsfeld's call for transformation has resulted in a new plan for the future of the Air Force. Faced with replacing aging aircraft and no promise of additional funds, the service plans to cut approximately 40,000 troops (12 percent) by the end of fiscal year 2009.[12] In addition, Secretary of the Air Force Michael Wynne introduced Air Force Smart Operations 21, a program designed to improve processes and reduce inefficiency. Secretary Wynne seeks to institutionalize continuous process improvement and "look at innovative ways to use our materiel and personnel more efficiently."[13]

These reductions continue a long pattern of drawing down the Air Force after the collapse of the Soviet Union. Reductions in AFW's enlisted personnel since 1985 have proved slower than those in the overall Air Force—not the case with officer reductions, which dipped in 2001 to as low as 43 percent of the 1985 levels compared to the overall Air Force low of 62 percent in 2001.[14]

Faced with pressure to reduce manpower and costs, AFW historically has automated processes to reduce manpower, consolidated work centers to reduce overhead, and leveraged weather data produced by others (e.g., the National Oceanographic and Atmospheric Administration and US Navy capabilities). AFW must cope with the challenge of simultaneously reacting to budget and manpower reductions while funding and managing a transformation to meet the demands of NCW.

Continuing Human-Based Forecast Tailoring

Forecast tailoring entails translation of measured or predicted environmental parameters (e.g., temperature, wind speed, relative humidity, etc.) to decision parameters (e.g., heat-stress index, crosswind, lock-on range, etc.) valid at mission-specific locations and times. For example, we utilize wind measurements at the approach end of the runway to calculate the crosswind component, which the supervisor of flying uses to decide whether to continue flight operations or divert aircraft to another field.

In 1997 AFW began an ambitious reengineering effort that redefined much of the weather function's organization and rearranged tasks among weather units. In the June 1998 edition of *Flying Safety*, Brig Gen Fred P. Lewis, Air Force director of weather, announced his decision to continue face-to-face weather briefings, provided by weather flights, despite a decrease in manpower.[15] Operational weather squadrons would perform some functions of the old weather flights at regional centers, allowing smaller flights to concentrate on tailoring weather information for their supported decision makers. Implementation of this concept emphasized having weather technicians tailor information to every mission and deliver the resulting product to the decision maker.

Arguably the optimum support methodology, dedicating a weather technician to every mission faces even more limitations today than in 1997. Obviously, the time required per product and number of weather technicians on duty at a given time constrain the rate of production. In order to provide quality support, these technicians must learn the missions and

environmental impacts for all of their supported decision makers—something that often calls for extensive on-the-job training. To make timely products, they must know the mission schedule and profiles and adjust to changes, such as delays in takeoff time or changes in the route of flight. En route target changes prove almost impossible to support unless we can dedicate a technician to a particular mission. The limited manpower available to meet demands forces weather flights to compromise by developing a single product to meet multiple missions (commonly referred to as a weather "flimsy" for multiple training missions), putting in longer hours, reducing time spent on each product, or simply admitting an inability to support some decision makers. This situation results in delayed, less accurate, and less detailed support, compared to the product created by using M2M access to weather databases. Over the next few years, AFW must contend with the prospect of asking a decreasing number of its technicians to support decision makers who prefer that their detailed weather information come from M2M or M2H interfaces.

Actions Required

To address this multifaceted and complex challenge, AFW must automate the forecast-tailoring process to meet the increasing demand for M2M and M2H access, change from a product-centric to an information-centric process, and reduce inconsistencies in the weather databases available to decision makers.

Automate Forecast Tailoring

The automation of forecast tailoring will permit decision makers to access M2H Web sites or program their decision-support-system applications to access M2M-enabled weather databases directly. They will no longer need to request products from a weather technician. Automation is preferable for several reasons:

- Forecast tailoring involves gathering information from many sources, determining values for the mission's locations and times, and then putting the information into the proper package and format—tasks easily automated.
- Humans limit the level of detail that can be provided in a timely manner. Network access, however, allows decision makers to receive much more detailed information—for example, by indicating conditions (winds, temperature, turbulence, icing, likelihood of thunderstorms, etc.) along a route of flight at every mile or minute instead of simply using maps that require crew interpretation.
- Unlike human processes, which introduce a degree of inconsistency and error because they are not perfectly repeatable, automated processes, when fully mature, quantify the error because of their repeatability. Using the earlier fighter/tanker example, we see that automated forecast tailoring would ensure that the fighter and tanker receive the same refueling-orbit forecast since identical algorithms would generate it from the same information in the database.
- Nearly instantaneous network access requires neither human involvement nor queuing for a human response (i.e., no "Please hold for the next available briefer").
- The number of possible products increases dramatically. Decision makers can use software written for a particular mapping or graphing technique to create all types of products without incurring a large manpower requirement or training burden.
- Perhaps the most compelling argument speaks to the expandable nature of network access—its ability to handle a large influx of decision makers without the need for additional manpower. In large, complex contingency situations, in which deployment of weather personnel may lag behind combat operations, such access can handle the spike in requests for weather information without adding manpower.

- Finally, in the few cases that justify using H2H, weather personnel can employ the developed M2H methodologies to develop their responses to H2H requests.

Of course, the quality of automation software remains critical to the success of implementing this approach. Patient development and testing as well as gradual implementation will prove key to building trust in the new technology. Several obstacles, however, block the path of a fully automated solution:

- Decision makers who prefer M2H and M2M must accept the responsibility of maintaining access to weather information and understanding the strengths and weaknesses of the content. This fundamental cultural change shifts the burden of retrieving weather information from the weather technician to the decision maker.
- Some decision makers will resist using network-based access methods. The need for H2H weather information, presented by the person who made the forecast, repeats the argument used by AFW reengineering to retain human-based forecast tailoring. However, when pressed, many decision makers admit they are trying to assess the uncertainty in the forecast by interacting with the presenter.[16] The fact that AFW has provided decision makers very little in the way of uncertainty assessments with weather predictions constitutes a serious shortcoming in its past support of those individuals. Weather predictions' varying degrees of uncertainty arise from the initial indeterminate state of the environment, primarily due to shortcomings of observation methodologies and coverage. Knowing this, decision makers must "look Stormy in the eye" to assess the uncertainty in the forecast. AFW has recognized this shortcoming and is developing objective methods to quantify uncertainty and include it in the weather database for retrieval by decision makers—a new capability reflected in AFW's *Characterizing the Environment Enabling Concept*, released in April 2006.[17] Because we do not yet have a methodology for humans to quantify uncertainty objectively, we must use subjective methods that depend on the widely varying skills of individual forecasters.
- Automation may affect accuracy. Currently, when forecasters tailor products for decision makers, they make adjustments to computer-based forecasts to account for model errors and biases, which usually, but not always, improve the accuracy of the information. If taking the human out of forecast tailoring results in a significant drop in accuracy, decision makers will demand reintroduction of the human. People should remain part of the process until the decision maker can pull from the database a product equal to or greater in accuracy and detail than the one previously available. We should not compromise accuracy for better access and more detail. If a human can improve the accuracy of weather information, his or her efforts must occur in the "prediction" process, thus making the results available in the weather-information database.
- Automating weather-impact assessments presents a challenge. AFW has gone to great lengths to catalogue environmental impacts on the various missions and operations it supports, believing they serve decision makers better by providing not only weather information but also the "so what" aspects. Even though decision makers want impact assessments, weather personnel may not possess adequate qualifications to make them. Decision makers should assess environmental impacts to their operations because of their familiarity with them and the possible workarounds. To help its personnel in this endeavor, AFW, in cooperation with the Army Research Laboratory, has developed rule sets to derive operational-impact assessments from decision parameters.[18] In a net-centric environment, conversion of these aids to a Web-based service would

give decision makers full control over the rule sets so they can modify them to suit their situation.

- Some decision processes require an environmental expert. In cases involving fluid, interactive decision processes and operations sensitive to the environment, decision makers may designate an individual to assess environmental impacts instead of accessing the database themselves. This designated environmental expert (not necessarily a weather technician) could use M2H interfaces and Web services to develop the necessary mission-tailored information.

Change from Product-Centric to Info-Centric

A decision to use network access in the future would require making any human adjustments to the information in the net-centric database—a shift that will force AFW to change its operations from product-centric to information-centric. AFW must concentrate its efforts (particularly its manpower) on optimizing the accuracy of decision parameters and rely on automation to generate the products. Several disadvantages accompany the product-centric approach:

- In most cases, manual production ties AFW's manpower to a schedule, eliminating the option to skip products or allow issuance of automated ones. Limited manpower constrains the number of different products and the frequency of updates.
- Weather personnel must make the products, even during completely benign weather, when an automated product would suffice.
- If demand for a particular product increases, manpower must shift to meet it. An information-centric approach would involve deriving products from the database, freeing personnel to modify the data as needed without concern about actual production.

In this effort, AFW can follow the lead of the National Weather Service, which is adopting an information-centric approach by implementing the National Digital Forecast Database.[19] The service's forecasters adjust a database at the office and use product-generation software to create everything from terminal-aerodrome forecasts, to severe-weather warnings, to the voice on the National Oceanographic and Atmospheric Administration's weather radio.

AFW is slowly working toward information-centric operations. In January 2006, it completed the *Exploit Environmental Information in Net-Centric Operations Enabling Concept*—the best statement of AFW's intent to move to information-centric processes.[20] Though placing human "adjustments" in the tailoring process, the document calls for making the results available in the weather database for access by decision makers. AFW's Joint Environmental Toolkit program, initiated in December 2005, includes some requirements for establishing information-centric forecast operations. The program's legacy requirements, which will be of use during the transition, may take priority if the program continues over schedule and over budget.[21]

The transition still needs momentum. Even as of March 2007, Air Force Instruction (AFI) 15-128, *Air and Space Weather Operations: Roles and Responsibilities*, required very specific products, tasking weather flights to "develop and conduct a mission execution forecast process to tailor weather products for operational users" and to "provide tailored weather effects products from Tactical Decision Aids and the Integrated Weather Effects Decision Aid to predict go/no go weather thresholds as coordinated with the host/parent unit."[22]

Improving Consistency

As previously mentioned, NCW's shared awareness and collaborative decision making require consistent information. Inconsistency manifests itself in several forms, the simplest being redundancy. If two collaborating decision makers get their weather information from different sources, they will likely receive varying forecasts because of the differences in

forecast models, human forecasters, or even tailoring software. Temporal inconsistency appears when one uses new information to update a forecast for a particular time and place. Since errors increase with time (e.g., the forecast for Monday issued on Friday [three-day forecast] is less accurate than the one issued on Saturday [two-day]), forecasts are updated until the last minute before an operation. Spatial inconsistency usually appears on boundaries between forecast models or agencies. In most cases, due to the natural variability of weather, spatial inconsistencies are not obvious. However, in some cases, usually in categorical forecasts (e.g., light, moderate, or severe turbulence), an inconsistency occurs that weather variability can't explain. Unfortunately, inserting humans into the prediction may often improve accuracy yet reduce consistency since two forecasters given the same inputs will produce different outputs.

To eradicate inconsistency completely, all individuals involved in making collaborative decisions must access the same, perfectly consistent weather database. To optimize consistency in the database, we would have to adjudicate or fuse (otherwise known as "ensemble") different forecast-model solutions and carefully monitor any human involvement to ensure consistency.[23] We can meet the first requirement in the net-centric world of the future, but control over information access is not absolute. The second requirement becomes possible only by centrally controlling production processes and reducing human involvement to a centrally manageable scale. Finally, if humans do improve the accuracy of the information they process, would reducing human involvement sacrifice accuracy for the sake of consistency?

AFW, the Navy, and the National Weather Service generate and maintain overlapping and redundant weather databases. Within AFW, redundant databases exist among the Air Force Weather Agency's production center and regional operational weather squadrons. Although Headquarters USAF/A3O's *Managing Net-Centric Environmental Data and Services Enabling Concept* describes how AFW will try to solve this problem, implementation proceeds slowly.[24] We must still resolve interservice and interagency issues regarding database authority.

The Way Ahead

Changing AFW without destroying its relationship with decision makers means that AFW leadership must develop the required technologies and carefully manage transitions, including actively changing AFW's and decision makers' cultures.

Technology

AFW's future lies in the development of the flexible, automated forecast-tailoring applications advocated here. If these applications prove unreliable or difficult to employ, decision makers will not use them and will insist on having a weather technician provide their information at the same time the corporate Air Force is cutting weather manpower. Weather support will suffer, and we will lose opportunities to anticipate and exploit weather information.

We must ensure the effectiveness of applications that enable weather technicians to generate or adjust information in the weather databases instead of creating mission-tailored products. Prior to entering into development, AFW must make some effort to verify that human involvement improves the accuracy of information. By *assuming* that humans always improve accuracy, AFW could end up spending precious software-development funds (and time) on applications that provide little or no benefit to the decision maker.

AFW must implement standard M2H and M2M interfaces as soon as possible and make them available to developers of decision support systems. If AFW delays, it will also lose opportunities to integrate weather information into key decision cycles.

Transitions

We must carefully manage three transitions to reach the proposed end state: changing decision makers' interfaces from H2H to M2H or M2M by using automated forecast-tailoring applications, changing weather technicians'

practice of creating mission-tailored products to adjusting weather information in the weather database, and changing the DOD meteorology community from decentralized to centralized control of distribution.

The transition from H2H to M2H/M2M involves two parts. First, AFW must establish a candidate M2H or M2M interface. Manageability requires that decision makers have a standard interface with enough flexibility to fit many of their specific product needs. Traditionally AFW has allowed embedded weather technicians to develop products with their supported decision makers. Usage of a standard interface, however, demands gathering, prioritizing, and translating those product requirements into a set of production capabilities. Second, we must convince decision makers of the advantages of transitioning to M2H or M2M, taking the steps necessary to adapt their processes to the new mode of communication. We should identify prototype decision makers for initial transition in order to establish models for similar decision makers. For example, a candidate F-16 unit should make the transition and set procedures for other F-16 units to follow. AFW should centrally monitor these efforts, not only to assist if problems occur but also to determine when it can move weather technicians to other tasks and locations, at which time AFW must replace their expertise and availability to answer questions with online information, a centralized call center, and/or traveling capability.

The move from product-centric to information-centric forecasting will require a major revision of AFW's instructions and training syllabi as they relate to forecast tailoring. This represents a significant change in AFW culture, in which forecast tailoring has served as the central justification for military weather forces. Today, regional operational weather squadrons perform some functions in an information-centric manner insofar as they issue regional products related to all missions and provide the basis for mission-tailored products. More weather technicians must switch focus from mission to weather. For example, a technician at a weather flight would no longer produce a series of mission-tailored flight weather briefings (DOD Form 175-1) for C-130 intratheater supply missions in Iraq since automated forecast-tailoring software would generate those products, based on the crews' request. Instead, the weather technician, probably at an operational weather squadron working in a team environment, would concentrate on accurately forecasting the temperature, winds, precipitation, turbulence, and icing associated with the cold front passing through Iraq that consequently affects *all missions in that region.* Technicians in weather flights would no longer generate products but would serve as "recognized experts, facilitating access to and understanding of environmental information."[25]

Finally, the DOD must come to grips with multiple, conflicting sources of weather information. The Navy and Air Force have significant infrastructures dedicated to producing this information. Although overlap has decreased somewhat in the last 15 years, one agency must have authority to determine the definitive characterization of the environment valid at a given time and place. After that agency begins to answer decision makers' requests with consistent information, it can take a hard look at the relative contributions of various overlapping inputs and cut those that fail to produce information cost-effectively, an action that may result in the consolidation of DOD centers.

Conclusion

The DOD's implementation of NCW will increase connectivity at lower echelons of command and throughout non-C2 functions. The services are actively increasing the connectivity of their forces and experimenting with new tactics, techniques, and procedures to take advantage of the new capability, looking to improve their forces' shared situational awareness and collaborative decision making.

As decision makers at all echelons become connected, they will demand more access to mission-tailored weather information via the network, without the direct involvement of a weather briefer. Given the increasing numbers of decision makers and the decreasing num-

bers of AFW personnel, AFW will not be able to match demand (particularly in a large contingency operation) unless it automates the forecast-tailoring process. The need for consistent information in collaborative decision making provides further impetus for automated product generation, requiring that steps be taken to increase consistency in the weather database.

Though it represents a significant change for AFW, automated forecast tailoring would remove potential human bottlenecks, allow greater detail, and increase the speed of access. To assure effectiveness, AFW must also change to information-centric forecasting, which captures human-adjusted forecasts and uncertainty estimates in databases that decision makers can access by using automated forecast-tailoring services as well as M2H and M2M interfaces.

Weather information remains important to DOD operations, but the briefers' days are numbered. Net-centric access to weather information is the wave of the future, and AFW needs to move ahead of that wave. ❑

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A Look down the Slippery Slope

Domestic Operations, Outsourcing, and the Erosion of Military Culture

Maj Bryan D. Watson, USAF*

Editorial Abstract: Two simultaneous trends inside America's military culture—its increasingly domestic role and its growing reliance upon defense contractors—illustrate considerable fundamental differences between uniformed military personnel and their commercially oriented counterparts. Employing a future scenario, the author contends that the growing civilian influence over formerly military endeavors will likely lead to serious trouble over time. If that is true, America's long-term ability to project combat power may ultimately falter as well.

This article takes the form of a fictional speech given by a senior Air Force officer to the Air Command and Staff College's (ACSC) class of 2017. In his presentation, the officer (himself a graduate of the class of 2007) conveys several warnings and historical perspectives, including personal opinions formed in the wake of the terrorist attacks of 11 September 2001 and Operation Iraqi Freedom. As a work of fiction, this article discusses the potential impact of certain trends within the American military establishment; it is not intended as a predictor of future events.

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Introduction to an Uncertain Future

Good morning, ladies and gentlemen—members of the ACSC class of 2017. Today it is my distinct pleasure to introduce to you a distinguished guest of the college. He has served in a variety of leadership positions throughout his career, and he is uniquely qualified to speak to us concerning the future of the United States Air Force, in that he is currently in charge of the Air Force's new Office of Force Reconstitution. Ladies and gentlemen, please welcome our next guest.

Thank you and good morning. Please take your seats.

I have to say that when I was a student here in 2007, I didn't dream that I would have the job that I have now—or that such a job would even be necessary. Mine is a new office, and, according to my title at least, I'm supposed to figure out how to "reconstitute" our Air Force.

Frankly, nothing would make me happier than not having a need for my job. Today, in 2017, recruiting has dropped to an all-time low even though financial incentives for enlistees remain at an all-time high. People tell me that morale is low, that Air Force families are disillusioned, and that some of our folks are treated poorly by local civilian communities. Essentially our institution no longer enjoys the prestige it once held. In a larger sense, though, I wonder if these issues are mere symptoms rather than "the problem."

Back in 2007, our military establishment focused on "transformation" with an eye toward winning the global war on terror.[1] It probably seems like ancient history to you, but when I was a student here, the terrorist attacks of 11 September 2001 (9/11) were still fresh in everyone's mind, and we found ourselves in the early days of fighting in Afghanistan and Iraq. I remember that many of my instructors and classmates were already veterans of those conflicts and that my peers were studying "fourth-generation warfare" as well as the challenges inherent in a counterinsurgency environment.[2]

Because of our intense concentration on those issues, not many people (including me) noticed the emergence of two trend lines in 2007. First, despite heavy emphasis on Iraqi operations, the American military had begun to see the prospect of significant involvement within the United States. In retrospect, I believe that our government began to turn to the armed forces to meet domestic needs because we were "handy, convenient, and superficially at least, effective."[3] Second, in the meantime, we had undertaken substantial efforts to employ contractors to do work that, historically, military members had performed. Today, I believe that these trend lines (domestic operations and our reliance on contractors) have intersected—with serious, unintended consequences.

Turning toward Home: Our Growing Domestic Role

I don't think many Americans noticed the military's expanding function within the country. For much of our history, our military has concerned itself with enemies located outside the nation's borders; however, with 9/11 came the realization that external enemies can attack us from within.

Accordingly, the military's domestic role began quietly increasing, without much debate. As one commentator observed, "[Despite apparent legal restrictions,] the use of a military surveillance system to help local law enforcement catch the Washington area sniper in the fall of 2002 drew little criticism."[4] We applied the same principle when we used "the National Guard to patrol airports or protect military installations, or supplement the Border Patrol."[5] On a basic level, employing 5,300 military troops to help guard the Olympics in Salt Lake City from terrorist attack seemed eminently reasonable, and military actions of "reinforcing civilian agencies . . . with drug interdiction, or [providing] security for . . . sporting events like the Super Bowl seemed, on the surface, functional and helpful."[6]

But a few people did express some concern; for example, one commentator warned that "regular armed forces need to face outward, against American enemies, rather than inward where a military force can become an institution acting on behalf of one part of the community against another. That corrodes the morale of the forces, harms recruiting, reduces

readiness, undermines the support of the country for the armed forces, and ultimately drives a wedge between the military and society."[7] In 2007, however, most of us just didn't appreciate the risk of relying upon the American military to ensure domestic tranquility.

This reliance was no secret. Indeed, the *National Strategy for Homeland Security* overtly favored a "thorough review of the laws permitting the military to act within the United States in order to determine whether domestic preparedness and response efforts would benefit from greater involvement of military personnel."[8] As you may recall, the Federal Emergency Management Agency came under intense criticism for its response to Hurricane Katrina in 2005, and government leaders responded with plans for military solutions to domestic crises, including natural disasters.[9] Thus, a few weeks after the hurricane, Pres. George Bush watched Hurricane Rita come ashore from Headquarters US Northern Command and suggested that the military should "determine and mobilize the national assets needed to respond to disaster."[10]

Thereafter, officials began planning for a more "rapid, robust role for active duty forces in responding to catastrophic disasters or terrorist attacks."[11] In fact, one senior official observed that "it is almost inevitable that the Department of Defense [DOD] will play a very substantial role in providing resources, equipment, command and control, and other capabilities in response to a catastrophic event . . . [since] only the Pentagon can marshal such resources and deploy them quickly during a time in which thousands of American lives may be at risk."[12] Interestingly, the American military's focus on domestic operations proceeded despite objections from state officials: the Texas governor "oppose[d] the federalization of emergency response efforts to natural disasters and other catastrophic events," and Arizona's governor warned that "moving disaster planning and response to Washington would be a disaster."[13]

That same year, world health officials predicted a possible influenza epidemic, and the desire for military involvement in domestic operations intensified.[14] Again, this trend met with little opposition, likely because of sentiments such as the public acknowledgment by the Centers for Disease Control that "the United States was vulnerable to chemical and bioterrorism acts."[15] The military's possible role actually formalized in the *National Strategy for Pandemic Influenza* in November 2005, when the federal government pledged to "develop mechanisms to activate" those "infrastructure-sustainment activities that the U.S. military and other government entities may be able to support during [such] a pandemic."[16]

It was straightforward logic: because of its proven ability to plan and execute, the military was well suited to confront domestic crises. As a student here at ACSC, I remember learning a bit about domestic operations; we spent time on graphs and organizational charts but not so much on the cultural problems inherent in domestic operations. I'm sure that has since changed.

At about that same time, our leaders began to seriously study the implications of what is popularly known as the Posse Comitatus Act.[17] I've since learned that people frequently misunderstand the term *posse comitatus*, which literally means "the power or force of the county," referring to the traditional power of a county sheriff to summon a posse to assist in keeping the peace, pursuing and arresting felons, and suppressing riots.[18] Historically, most jurisdictions permit a police officer to seek assistance in arresting or recapturing an escaped prisoner.[19] The Posse Comitatus Act represents a notable exception insofar as it forbids using federal troops for such a purpose, thus reflecting American skepticism regarding a standing army that keeps the civil peace.[20]

The principle underlying this act has an interesting history in the United States, and we would do well to remember it. Specifically, despite threats to our national security from several powerful European nations, our Founding Fathers decided to limit the domestic powers of the American military.[21] Delegates to the Constitutional Convention hotly debated military issues, even arguing "whether there should be a standing army at all, or if defense of the nation should rely entirely on the state militias."[22] Despite the fact that the Constitution ultimately provided for Congress's ability to raise a standing army, its

only expressly stated domestic role involved "suppress[ing] insurrections."[23]

The danger of a standing military represented a point of serious contention. Convention delegate Luther Martin of Maryland declared to his state legislature that "when a government wishes to deprive its citizens of freedom, and reduce them to slavery it generally makes use of a standing army."[24] Similarly, Alexander Hamilton argued that standing armies can "place the population under military subordination" and that "by degrees the people are brought to consider the soldiery not only as their protectors, but as their superiors."[25] On another occasion, James Madison observed that "the liberties of Rome proved the final victim to her military triumphs" and that "[a] standing force, therefore, is a dangerous, at the same time that it may be a necessary, provision. On the smallest scale it has its inconveniences. On an extensive scale its consequences may be fatal. On any scale it is an object of laudable circumspection and precaution."[26] These types of concerns have undergirded the Posse Comitatus Act for most of its life, and, ultimately, after passage of the act, "it was understood that federal troops were not available to supplement civilian law enforcement officials."[27]

Gradually, that attitude began to soften. Was there some kind of sinister conspiracy to have the American military assume more and more domestic responsibilities? No, I think the answer is far simpler. I believe that the phenomenon involved simple "mission creep" during a time of intense anxiety over our society's internal safety.[28] I'm reminded of the words of Vice Adm Arthur Cebrowski, USN, retired, the Pentagon's former transformation chief, who observed that the "post-9/11 reality" indicated "that we need[ed] a new way to rebalance our overseas interests and our concern for homeland security."[29] In retrospect, his words heralded a larger domestic role for America's military.

Ultimately, my advice is simple. As future leaders, make sure that you have a firm understanding of the proper functioning of a military in a democratic society. Never forget that you are public servants, and never take your public support for granted. That said, we should all realize that not everyone who performs public functions is necessarily a public servant.

For Profit and Country: Our Reliance upon Contractors

In the early days of my career, I witnessed a remarkable increase in our reliance upon private contractors. During 1991's Operation Desert Storm, 9,200 contractors deployed to support military operations.[30] By 1999 some military observers were expressing sentiments such as, "Never has there been such a reliance on nonmilitary members to accomplish tasks directly affecting the tactical successes of an engagement."[31] This trend continued; as our military downsized, privatization increased, and Iraqi Freedom certainly proved no exception.[32] During that conflict, "estimates of the number of government civilian employees and contractor personnel present in Iraq range[d] from twenty to thirty thousand, making civilian workers the second largest contingent in-country."[33]

In Iraq, arguably it became difficult to tell the difference between functions performed by contractors and uniformed military members. Civilians "maintain[ed] complex weapon systems such as the F-117 Nighthawk fighter, B-2 Spirit bomber, M1 Abrams tank, and TOW missile system, and operat[ed] the Global Hawk and Predator unmanned aerial vehicles"; "conduct[ed] intelligence collection . . . and analysis"; and "interrogated prisoners of war and other detainees."[34]

True, the American military historically has relied upon contractors' services, but in Iraq and Afghanistan, the reliance became unprecedented.[35] In Iraq we employed contractors after we fielded systems so new that the services could not develop training courses for uniformed personnel.[36] For example, during the first combat deployment of the RQ-4A Global Hawk unmanned aerial vehicle in support of Operation Enduring Freedom, 56 contractors deployed as part of an 82-member military, civil service, and contractor "team."[37] Subsequently, the use of contractors in this type of role grew further, to the point that contractors began "conducting combat-type operations"

that included "operat[ing] the [Global Hawk]" and even "serv[ing] as Global Hawk pilots."[38]

Despite recognition that this could create numerous issues—not the least of which was the fact that UAV contractor pilots could be considered unlawful combatants under the Law of Armed Conflict—the American military continued to rely upon contractors.[39] A publication generated right here at Maxwell AFB, Alabama, even addressed this issue in 2004, warning that "the citizen must be a citizen not a soldier. . . . War law has a short shrift for the noncombatant who violates its principles by taking up arms."[40]

Privatization continued as a result of deep cuts in military personnel, claims that contractors could perform more efficiently, the increasing complexity and sophistication of weapon systems, and, of course, desires to deploy contractors in order to thwart troop ceilings mandated by legislation or a host country.[41] We even specifically designed some weapon systems to rely upon contractor support instead of uniformed personnel, again amid claims of "cost-effectiveness."[42] One observer even remarked, "Simply stated it is impossible to deploy without [contractors]."[43]

Additionally, we started seeing more "private security companies" in conflicts around the world—including Iraq. Although official reports declared that such companies in Iraq "provide only defensive services," the extent of these contractors' activities became quite substantial and, in the opinion of some people, practically "indistinguishable from military operations."[44] In April 2003, for instance, employees of Blackwater USA battled with insurgents attacking personnel assigned to the US-led Coalition Provisional Authority in Najaf. They fired thousands of rounds of ammunition and hundreds of grenades, and Blackwater even used its own helicopters to supply them during the fighting.[45] Later, the company's leadership even offered its services as an army for hire in the world's "trouble spots," stating that Blackwater "stands ready to help keep or restore the peace anywhere it is needed."[46]

Furthermore, contractors' activities weren't limited to entities affiliated with the DOD. One particular example comes to mind: in February 2006, "private security workers under contract with the State Department shot and killed two Iraqi civilians."[47] We would have done well to carefully note the anger expressed by the brother of one of the casualties: "I swear to God that I will take revenge for my brother. . . . They did not even stop to take him to the hospital. . . . This is their new democracy, this is the freedom they brought."[48] On a more troubling note, the victims' angry relatives "did not appear to distinguish between U.S. troops and the contractors, who many Iraqis say resemble foreign soldiers."[49] Additionally, in late 2007, Blackwater USA came under intense public scrutiny following allegations that innocent Iraqi civilians were killed by the company's employees.[50]

Whenever I tell stories like this, many people ask themselves, "How did we get to this point? Isn't the government supposed to do the fighting?" Well, I've asked myself that same question, and I've done a little research. It all started innocently enough, back in the 1950s, when the federal government "required its agencies to procure all commercial goods and services from the private sector, except when 'not in the public interest.' "[51] Years later, Congress required federal agencies to outsource government positions not "inherently governmental."[52] Of course, the requirement applied to positions held by military personnel, and the DOD complied, mandating that "functions and duties that are inherently governmental are barred from private sector performance."[53]

Eventually, reliance upon contractors simply became expedient. As defense budgets struggled under increased missions and exhortations to trim manpower, we began to use contractors in place of uniformed personnel.[54] Civilian ranks weren't immune either. Between 2000 and 2006, the military permitted the private sector to compete against federal civilian workers, with contractors winning about 60 percent of the time.[55]

As we contracted out more and more military functions, many service members applauded the additional manpower they received when contractors filled voids left by cuts in military personnel.[56] Moreover, members of the public appreciated the budgetary

savings promised by a smaller military, and as we redirected federal dollars to contractors, those companies enjoyed remarkable revenues.[57] Basically, most folks seemed happy.

Back then, as a junior field-grade officer like you, I focused intently—as did my peers—on how to just get the job done for my boss. If I needed a task accomplished but didn't have a military member available, I thought, "Why don't we find a contractor to do it?" I freely admit that I failed to fully grasp basic principles that underpinned my military service; that is, I remembered my high school civics lessons, but I didn't really *internalize* them. My peers and I thought that phrases like "the common defense," the relationship between "military" and "civil" power, and "government of the people, by the people, for the people"—as expressed in the Constitution, Declaration of Independence, and Gettysburg Address, respectively—were just platitudes thrown around by academics and politicians. We were wrong. The ability to apply military force is an obligation of profound significance for the American people, and we didn't fully appreciate that idea in the context of contractors. I think of a great quotation that I wish I had heard back when I sat where you do now: "[D]emocratic government is responsible government—which means accountable government—and the essential problem in 'contracting out' is that responsibility and accountability are greatly diminished."[58]

As someone observed in 2005, "To put it bluntly, the incentives of a private company do not always align with its clients' interests—or the public good."[59] After all, "even when contractors do military jobs, they remain private businesses."[60] Therein resides even more concern: the possible lack of control over contractors' actions and, potentially, their qualifications. For example, "U.S. Army investigators of the Abu Ghraib prisoner-abuse scandal found that . . . all of the translators and up to half of the interrogators involved were private contractors" while "approximately 35 percent of the contract interrogators lacked formal military training as interrogators."[61] Additionally, remember that private companies retain full control over which contracts they will enter into and can even refuse to perform a job that they've agreed to if it becomes too perilous or unprofitable.[62] Granted, if contractors abandon their duties, they might incur some financial penalties—but rarely anything more serious. On the other hand, if you—as a military member—walk off the job, you could be court-martialed.[63]

Really, the contract itself provides the only control or oversight of contractors and their employees. With limited exceptions, commanders and their staffs cannot supervise contractors.[64] Instead, service members must work through contracting officers if any changes to a contract become necessary, and commanders have no disciplinary authority over a contractor's employees.[65]

Eventually, some analysts started asking how to improve this arrangement, particularly given the possibility that third parties could equate contractors' actions with those of the American government. One possible answer became reliance upon the Military Extraterritorial Jurisdiction Act (MEJA), which made someone, such as a contractor, who is "employed by or accompanying the Armed Forces outside the United States," criminally liable if he or she engages in an act *outside* the United States that would have constituted a crime had it occurred *inside* the United States.[66] That said, any such prosecution would remain at the discretion of a US attorney.[67] This contrasts starkly with provisions of the *Uniform Code of Military Justice* (*UCMJ*), which has worldwide applicability to American military personnel and whose prosecutorial discretion resides with commanders.[68] Sure, a change in the law supposedly made contractors subject to the *UCMJ* in times of a "declared war or a contingency operation."[69] Nevertheless, as a matter of practicality, political realities rendered the change exceedingly difficult to implement.

Military reliance on contractors continued, with the term *inherently governmental* progressively becoming less meaningful.[70] Because of advancements in technology, even the operation of major weapon systems—such as the F-117A stealth fighter, M1-A tank, Patriot missile, and Global Hawk—became "contractor dependent," a situation that encountered only few objections.[71] As time passed, contractors

guarded our fence lines and handled munitions. They shoveled snow, treated the sick and wounded, repaired buildings, paid the troops, processed military awards and decorations, and even served as air traffic controllers. The response to anyone who objected was, "If the Air Force can hire a contractor to remotely pilot a combat aircraft in Iraq, or if the federal government can hire private employees to battle insurgents, are any functions really 'inherently governmental' anymore?"

Furthermore, as contractors integrated themselves more completely into the Air Force's operations, they actually began to compete with the military for talent.[72] Positions offered by certain private firms to military members allowed them to earn "anywhere from two to ten times what they made in the regular military"; for example, in Iraq, former special forces personnel earned as much as $1,000 a day as contractors.[73] Most significantly, many contractors actively recruited recent retirees or military members trained for a specific job at government expense.[74] We had started down a slippery slope, and there was no end in sight.

Ultimately, the military and private industry began to blend in ways we had never seen before, producing a direct impact upon our military culture. As a student here at ACSC, for example, I remember living in base housing in which only military members and their families resided. I drove through that area today and saw a lot of nonmilitary faces. Many years ago, government officials decided to privatize a substantial portion of military family housing, thereby merging private corporations—and their understandable desire for financial profit—with our housing communities.[75] These arrangements permitted such companies to control on-base real estate for 50 years, and we allowed civilians with no military affiliation to live on our bases if the housing areas weren't full, thereby assuring contractors a predictable stream of income.[76]

Thus, life on military installations gradually became less "military." As civilians moved into our housing areas, they brought varied lifestyles, including certain social practices that clashed with traditional military ones. In response, many of our families flatly refused to live in privatized housing, ultimately leading to even greater numbers of civilians living on base. I associate some of my fondest memories from my early years of service with the close personal and professional relationships that my family developed with other military families who lived in base housing. Sadly, those times are gone.

To cite another example, the Air Force also decided to partially contract out the function of military gate guards in order to make uniformed security forces available for other missions.[77] Yes, the effect came about only gradually, but in the end, no one called us "Sir" or "Ma'am," and no one saluted officers when they entered the base. We didn't complain because we feared being labeled self-important or pompous—but we should have complained. You see, we hear about the importance of military customs and courtesies, but contracted civilians reduced them to mere "customer service."[78] Perhaps most importantly, back when military personnel served as gate guards, they presented an unambiguous image to members of the American public who passed by our installations—but that changed too. Outsourcing of that gate-guard function—though barely noticeable in the larger scheme of our national defense—became a microcosm of the larger issue: the erosion of our military culture. You see, it was happening before our very eyes.

A Possible Future

Against this backdrop, we entered the post–Iraqi Freedom world. As I mentioned before, at this point, two trend lines began converging: increased military involvement in domestic issues and rise of the military's reliance on contractors. When they collided, we found ourselves in trouble.

Remember, our reliance on contractors began long before the bird-flu epidemic of 2008, the New York hurricane of 2010, or the American Midwest earthquake of 2015.[79] As you recall, these events demanded significant domestic military action, augmented by large numbers of contractors.

Think, if you will, about the bird-flu epidemic, when US Northern Command en-

forced a three-state quarantine by deploying thousands of active duty troops into metropolitan areas. Remember how masses of civilians tried to flee infected areas and how military aircraft threatened to shoot down civilian jetliners after their pilots tried to violate the quarantine. Remember the civilian deaths during those months of turmoil and the claims of many observers that somehow the military was responsible, either by acting too harshly or by not acting quickly enough to quell violence. My point? Just think for a minute about how the military's status suffered in the weeks and months that followed. That's a danger inherent in domestic military operations.

Next, think about the New York hurricane of 2010, when we saw a near repeat of the bird-flu riots. But also remember the huge numbers of contract security guards who augmented military forces and law enforcement. After the crisis, do you recall the allegations of physical abuse that many New Yorkers reported they had suffered at the hands of security guards? How some civilians complained—perhaps rightfully—that we violated their constitutional rights?[80] I am reminded of the lessons that we should have learned from Hurricane Katrina in 2005, when discipline apparently broke down among some law-enforcement personnel in New Orleans.[81]

Finally, remember the earthquake of 2015. By that time, law-enforcement entities, the military, contractors, and other federal and state agencies seemed to have blended into a single organization. Remember how organizational structures overlapped to the extent that no one knew who was in charge. At the time, I noticed that contractors and military members wore similar uniforms, and I remember asking myself, "How did we get here?"

I was in the affected area after the earthquake, and I can tell you without hesitation that some Americans genuinely feared people in uniform.[82] Granted, they had already gone through a traumatic experience, but they also simply feared the very people that our government had sent to help. Everyone remembered the bird-flu riots as well as the allegations of abuse from New York. In the end, the public couldn't tell the difference between a service member and a contractor; you see, each person in the "military-industrial complex" looked alike, reported to the same boss, wore the same clothes—and carried the same weapons.[83]

The Erosion of Military Culture?

As I close, I ask you to consider the fact that our government has "long recognized that the military is, by necessity, a specialized society separate from civilian society."[84] Consequently, other governmental officials historically have had a willingness to defer to the judgments of military decision makers.[85]

Well, according to some folks in our government, "a specialized society separate from civilian society" simply no longer exists. They argue that the blending of contractors and interagency workers into our domestic military structure has ended a separate culture. After all, why should military members fall into some different category when they do the same job as contractors? Today, does anything really set the military apart?

To cite a quick example, currently in 2017 you should know about the push to expand the MEJA as a comprehensive replacement for the *UCMJ*.[86] As you might recall from my earlier comments, the MEJA served as a mechanism for addressing criminal activity among civilians in support of combat operations overseas. Now, however, some people argue that civilian laws should remain the sole means of addressing criminal activity by all members of the "defense team"—that we should treat contractors, military, National Guard, and other employees equally under the law. To the uninitiated, this argument might seem compelling. However, if this effort succeeds, commanders will no longer be involved in even the most serious disciplinary issues affecting their troops. Interestingly, some analysts say that these efforts arise from the fact that few lawmakers nowadays have any military experience.[87]

I ask you to consider carefully a couple of final thoughts. First, think about George Washington's famous admonition that "discipline is the soul of an army."[88] If that's true—and I think it is— where does that leave us to-

day, when we rely so heavily on contractors? Second, as you think about the proper role of a military in a democracy, I want you to consider Chief Justice Earl Warren's observation that "the military establishment is, of course, a necessary organ of government; but the reach of its power must be carefully limited lest the delicate balance between freedom and order be upset."[89] Has our society somehow lost the ability to limit the military establishment's reach? Does it matter that the definition of our "military establishment" has radically changed?

In terms of the bottom line, we face some tough times, but I'm confident that we'll work through them. This afternoon, I'm headed back to Washington to continue reconstituting our force, but before I go, I really want to know what you think. ❑

Notes

1. *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, 2006), v–ix, http://www.comw.org/qdr/qdr2006.pdf (accessed 17 April 2007).

2. According to Col Thomas X. Hammes, fourth-generation warfare "is an evolved form of insurgency." It is "rooted in the fundamental precept that superior political will, when properly employed, can defeat greater economic and military power" and "does not attempt to win by defeating the enemy's military forces." Instead, it "directly attacks the minds of enemy decision makers to destroy the enemy's political will." Fourth-generation wars are protracted affairs, "measured in decades rather than months or years." Col Thomas X. Hammes, *The Sling and the Stone: On War in the 21st Century* (St. Paul, MN: Zenith Press, 2004), 2.

3. Richard H. Kohn, "Using the Military at Home: Yesterday, Today, and Tomorrow," *Chicago Journal of International Law* 4 (Spring 2003): 182–83.

4. Ibid, 183. According to Eugene Fidell, a former Coast Guard judge advocate now in private practice, "Title 10 of the U.S. Code carefully delineates the circumstances under which the Defense Department can make personnel available to operate equipment, at the request of a federal law enforcement agency. Under Section 374, the defense secretary can aid federal civil authorities with 'aerial reconnaissance'—but only in cases related to immigration, customs, narcotics trafficking or terrorism." Noting that the first three do not relate to the sniper case, Fidell remarks that during the investigation of the sniper case, US government officials stated that they had no evidence of any terrorism connection. Fidell also refers to Department of Defense Directive (DODD) 5525.5, *DoD Cooperation with Civilian Law Enforcement Officials*, 15 January 1986, which prohibits the military from "directly assisting [civilian law-enforcement officials] in the surveillance or pursuit of individuals." Elaine M. Grossman, "Former JAG: Military Aid in D.C. Sniper Pursuit May Have Broken Law," *Inside the Pentagon*, 14 November 2002, http://www.fas.org/sgp/news/2002/11/itp111402.html (accessed 17 April 2007).

5. Kohn, "Using the Military at Home," 190.

6. Grossman, "Former JAG"; and Kohn, "Using the Military at Home," 190.

7. Kohn, "Using the Military at Home," 190.

8. Pres. George W. Bush, *National Strategy for Homeland Security* (Washington, DC: White House, July 2002), 48, http://www.whitehouse.gov/homeland/book/index.html (accessed 17 April 2007).

9. "Senators Collins, Lieberman Hold Katrina Hearing, Acting FEMA Director Testifies," Senate Committee on Homeland Security and Governmental Affairs, 6 October 2005, http://www.senate.gov/~gov_affairs/index.cfm?FuseAction=PressReleases.Detail&Affiliation=C&PressRelease_id=1113&Month=10&Year=2005 (accessed 17 April 2007); and "U.S. Senate Homeland Security and Governmental Affairs Committee Hearing on DHS Preparation for and Response to Hurricane Katrina," *washingtonpost.com*, 15 February 2006, http://www.washingtonpost.com/wp-dyn/content/article/2006/02/15/AR2006021501475.html (accessed 17 April 2007). "President Bush started the buzz about an expanded domestic role for the military in September, when he lauded the military response to Hurricane Katrina. In his Sept. 15 address to the nation from hurricane-stricken New Orleans, Bush said, 'A challenge on this scale requires greater federal authority and a broader role for the armed forces.'" John A. Tirpak, "Domestic Roles for Troops?" *Air Force Magazine* 88, no. 12 (December 2005): 10, http://www.afa.org/magazine/Dec2005/1205watch.asp.

10. Tom Philpott, "Posse Comitatus," *Air Force Magazine* 88, no. 11 (November 2005): 29, http://www.afa.org/magazine/nov2005/1105congress.asp.

11. Ann Scott Tyson, "Pentagon Plans to Beef-Up Domestic Rapid-Response Forces," *Washington Post*, 13 October 2005, 4.

12. Ibid.

13. Juliana Gruenwald, "Governors Oppose Expanding Military's Role in Disasters," *National Journal's CongressDailyAM*, 20 October 2005, 1.

14. "If the [bird-flu] virus gained the ability to pass easily between humans the results could be catastrophic. Worldwide, experts predict anything between two million and 50 millions deaths." "Q&A: Bird Flu," BBC News, 20 November 2006, http://news.bbc.co.uk/1/hi/health/3422839.stm (accessed 17 April 2007). "In October [2005, President] Bush suggested the military might take a leading role in responding to a flu pandemic. The military, he said, with the ability to 'plan and move' might be the best solution to effecting the quarantines." Tirpak, "Domestic Roles for Troops?" 10–11.

15. Edward P. Richards et al., "Bioterrorism and the Use of Fear in Public Health," *Urban Lawyer* 34, no. 3 (Summer 2002): 689, http://biotech.law.lsu.edu/cphl/articles/urbanlawyer.pdf.

16. Pres. George W. Bush, *National Strategy for Pandemic Influenza* (Washington, DC: White House, November 2005), 9, http://www.whitehouse.gov/homeland/nspi.pdf (accessed 17 April 2007).

17. "Whoever, except in cases and under circumstances expressly authorized by the Constitution or Act of Congress, willfully uses any part of the Army or the Air Force as a posse comitatus or otherwise to execute the laws shall be fined under this title or imprisoned not more than two years, or both." *Posse Comitatus Act, US Code*, vol. 18, sec. 1385. By its terms, the act is technically inapplicable to Marine Corps and Navy forces. However, it has been construed to apply to them by virtue of long-standing policy.

18. "The entire population of a county above the age of fifteen, which a sheriff may summon to his assistance in certain cases, as to aid him in keeping the peace, in pursuing and arresting felons, etc. *Williams v. State*, 253 Ark. 973, 490 S.W.2d 117, 121." *Black's Law Dictionary*, 6th ed., s.v. "posse comitatus." See also Sean J. Kealy, "Reexamining the Posse Comitatus Act: Toward a Right to Civil Law Enforcement," *Yale Law and Policy Review* 21 (Spring 2003): 389.

19. Kealy, "Reexamining the Posse Comitatus Act," 389.

20. Ibid.

21. Ibid.

22. Ibid., 391.

23. US Constitution, art. 1, sec. 8, cl. 15, *National Archives Experience*, http://www.archives.gov/national-archives-experience/charters/constitution_transcript.html (accessed 17 April 2007). This clause was invoked on only a limited number of occasions, including Shay's Rebellion (1786–87), the Whiskey Rebellion (1794), the Dorr Rebellion (1842), and the Civil War (1861–65). Kealy, "Reexamining the Posse Comitatus Act," 391.

24. Kealy, "Reexamining the Posse Comitatus Act," 391.

25. Ibid.; and Alexander Hamilton, "The Consequences of Hostilities between the States," Federalist no. 8, 20 November 1787, *The Federalist Papers*, Library of Congress, http://thomas.loc.gov/home/histdox/fed_08.html (accessed 17 April 2007).

26. James Madison, "General View of the Powers Conferred by the Constitution," Federalist no. 41, n.d., *The Federalist Papers*, Library of Congress, http://thomas.loc.gov/home/histdox/fed_41.html (accessed 17 April 2007).

27. Jack H. McCall Jr. and Brannon P. Denning, "Mission Im-Posse-ble: The Posse Comitatus Act and Use of the Military in Domestic Law Enforcement," *Tennessee Bar Journal* 39 (June 2003): 31, http://www.tba.org/Journal_Tbarchives/tbj-jun03.html.

28. "For America's military and political leaders, one of the central lessons of the 1990s was to avoid 'mission creep,' where U.S. troops face an ill-defined and ever-expanding objective for which they are neither well-prepared nor supported. . . . Today, mission creep is back. . . . Now it looks like the Pentagon could soon supplement its military, reconstruction and diplomatic portfolios with domestic disaster relief responsibilities." Julianne Smith and Derek Chollet, "The Return of U.S. Mission Creep," *Defense News*, 10 October 2005, http://www.defensenews.com/story.php?F=1164780&C=commentary (accessed 17 April 2007).

29. Vince Rawley, "Changing of the Guard: Revised Missions, Chain-of-Command Pattern Emerging," *Army Times*, 25 November 2002, 23.

30. Lt Col Michael J. Guidry and Col Guy J. Wills, "Future UAV Pilots: Are Contractors the Solution?" *Air Force Journal of Logistics* 28, no. 4 (Winter 2004): 6, http://www.aflma.hq.af.mil/lgj/Vol%2028%20No%204%20www.pdf.

31. Lt Col Stephen M. Blizzard, "Increasing Reliance on Contractors on the Battlefield," *Air Force Journal of Logistics* 28, no. 1 (Spring 2004): 5, http://www.aflma.hq.af.mil/lgj/Vol%2028%20No%201%20www.pdf.

32. "From 1989 to 1999, the active-duty force was reduced from 2,174,000 to 1,453,000. Meanwhile, the military continued to fill its inventory with sophisticated equipment, increasing the military's dependency on civilian specialists or contractors. 'Highly technical and complex weaponry is flooding the Armed Forces, requiring contractors to be hired to train military operators and maintain and operate the systems.'" Guidry and Wills, "Future UAV Pilots," 6. "In no conflict has the civilian footprint supporting military operations been larger than in Iraq." Michael N. Schmitt, "Humanitarian Law and Direct Participation in Hostilities by Private Contractors or Civilian Employees," *Chicago Journal of International Law* 5, no. 2 (Winter 2005): 511, http://www.michaelschmitt.org/images/Schmitfinal.pdf.

33. Schmitt, "Humanitarian Law and Direct Participation," 512.

34. Ibid.

35. Lt Col James E. Manker Jr. and Col Kent D. Williams, "Contractors in Contingency Operations: Panacea or Pain?" *Air Force Journal of Logistics* 28, no. 3 (Fall 2004): 14, http://www.aflma.hq.af.mil/lgj/Vol%2028_No3_WWW.pdf.

36. "Contractors recently deployed with the 3d Infantry Division to Iraq to support the high-tech digital command and control systems still under development. Similarly, when the Air Force deployed the Predator unmanned aerial vehicle, contractor support was required because the vehicle was still in development, and Air Force personnel had not been trained to maintain the Predator's data link system." Blizzard, "Increasing Reliance on Contractors," 8.

37. Guidry and Wills, "Future UAV Pilots," 5.

38. Ibid. For a discussion of the Global Hawk's capabilities and operators' responsibilities, see "RQ-4A Global Hawk (Tier II+ HAE UAV)," *FAS* [Federation of American Scientists] *Intelligence Resource Program*, http://www.fas.org/irp/program/collect/global_hawk.htm (accessed 19 November 2007).

39. "UAV contractor pilots could be considered unlawful combatants [if they take a direct part in hostilities]." Ibid., 9–10. "Pursuant to Article 51.3 of the 1977 Protocol Additional I to the Geneva Conventions, . . . civilians enjoy immunity from attack during international armed conflict 'unless and for such time as they take a *direct part in hostilities*.' Those who do directly participate may be legally targeted[,] . . . do not benefit from prisoners of war protections[,] . . . [and] may be punished for

their actions" (emphasis in original). Schmitt, "Humanitarian Law and Direct Participation," 519–20.

40. Blizzard, "Increasing Reliance on Contractors," 8.

41. Ibid., 6.

42. "A new Marine Corps truck was designed to be at least partially contractor supported because the limited number of assets made contractor support more cost effective. Similarly, the Army's Guardrail surveillance aircraft is entirely supported by contractors because it was not cost-effective to develop an organic maintenance capability." Ibid., 8.

43. Manker and Williams, "Contractors in Contingency Operations," 19.

44. Schmitt, "Humanitarian Law and Direct Participation," 514.

45. Ibid.

46. Bill Sizemore, "Blackwater USA Says It Can Supply Forces for Conflicts," *Virginian-Pilot* [Norfolk], 30 March 2006, http://content.hamptonroads.com/story.cfm?story=102251&ran=202519&tref=po (accessed 17 April 2007).

47. Jonathan Finer, "State Department Contractors Kill Two Civilians in N. Iraq," *Washington Post*, 9 February 2006, A18.

48. Ibid.

49. Ibid.

50. See, for example, Brian Bennett, "America's Other Army," *Time.com* [*in partnership with CNN*], 18 October 2007, http://www.time.com/time/world/article/0,8599,1672792,00.html?xid=feed-cnn-topics.

51. Rebecca Rafferty Vernon, "Battlefield Contractors: Facing the Tough Issues," *Public Contract Law Journal* 33 (Winter 2004): 376.

52. *Federal Activities Inventory Reform (FAIR) Act, US Code*, vol. 31, sec. 501.

53. Vernon, "Battlefield Contractors," 376; and Department of Defense Instruction (DODI) 3020.41, *Contractor Personnel Authorized to Accompany the U.S. Armed Forces*, 3 October 2005, par. 6.1.5.

54. "Contractors have been used to fill the void created by the drawdown in troop strength." Blizzard, "Increasing Reliance on Contractors," 7.

55. George Cahlink, "Sharp Focus on Air Force Civilians," *Air Force Magazine* 89, no. 2 (February 2006): 87, http://www.afa.org/magazine/feb2006/0206civilian.asp.

56. P. W. Singer, "Outsourcing War," *Foreign Affairs* 84, no. 2 (March/April 2005): 128; and Blizzard, "Increasing Reliance," 7.

57. Listings of contractors related to operations in Iraq and Afghanistan are available online from "Windfalls of War: U.S. Contractors in Afghanistan and Iraq," Center for Public Integrity, http://www.publicintegrity.org/wow (accessed 17 April 2007).

58. Singer, "Outsourcing War," 126.

59. Ibid., 124.

60. Ibid.

61. Ibid., 127, 125.

62. Ibid., 124.

63. "Article 86—Absence without Leave," *Manual for Courts-Martial (2005 Edition)* (Washington, DC: Government Printing Office, 2005), IV-12, http://www.army.mil/usapa/epubs/pdf/mcm.pdf (accessed 17 April 2007).

64. Such exceptions would constitute "personal service contracts," which are generally prohibited. See *Federal Acquisition Regulation* (Washington, DC: General Services Administration, Department of Defense, National Aeronautics and Space Administration, March 2005), subpart 37.1, http://www.acqnet.gov/far (accessed 17 April 2007).

65. Ibid., subpart 1.6. "Contractors . . . remain private businesses and thus fall outside the military chain of command and justice systems." Singer, "Outsourcing War," 124.

66. *Military Extraterritorial Jurisdiction Act, US Code*, vol. 18, sec. 3261.

> Contractor personnel fulfilling contracts with the U.S. Armed Forces may be subject to prosecution under Federal law, including but not limited to the Military Extraterritorial Jurisdiction Act (MEJA), 18 U.S.C. § 3261 . . . which extends U.S. Federal criminal jurisdiction to certain DoD contingency contractor personnel, for certain offenses committed outside U.S. territory. . . . Pursuant to the War Crimes Act, 18 U.S.C. § 2441, . . . Federal criminal jurisdiction also extends to conduct that is determined to constitute a violation of the law of war when committed by a civilian national of the United States. In addition, when there is a formal declaration of war by Congress, DoD contingency contractor personnel may be subject to prosecution under the Uniform Code of Military Justice (UCMJ).

DODI 3020.41, *Contractor Personnel*, par. 6.1.3.

67. "The U.S. Attorney for the District in which there would be venue for a prosecution *may*, if satisfied that probable cause exists to believe that a crime has been committed and that the person identified has committed this crime, file a complaint. . . . As an alternative, the U.S. Attorney *may* seek the indictment of the person identified" (emphasis added). DODI 5525.11, *Criminal Jurisdiction over Civilians Employed by or Accompanying the Armed Forces outside the United States, Certain Service Members, and Former Service Members*, 3 March 2005, par. 6.2.3.

68. Military law consists of the statutes governing the military establishment and regulations issued thereunder, the constitutional powers of the President and regulations issued thereunder, and *the inherent authority of military commanders*. Military law includes jurisdiction exercised by courts-martial and the jurisdiction exercised by commanders with respect to nonjudicial punishment. The purpose of military law is to promote justice, to assist in maintaining good order and discipline in the armed forces, to promote efficiency and effectiveness in the military establishment, and thereby to strengthen the national security of the United States. (emphasis added)

U.S. v. Solario, in *Supreme Court Reporter*, vol. 107 (1987), 2924. See also "Preamble," *Manual for Courts-Martial*, I-1.

69. See P. W. Singer, "The Law Catches Up to Private Militaries, Embeds," and citations therein regarding the amendment to Article 2 of the *UCMJ*, *DefenseTech.org*, http://www.defensetech.org/archives/003123.html (accessed 17 April 2007).

70. Inherently governmental functions are not subject to outsourcing although that concept may be changing. For a discussion of the apparently evolving definition of the term *inherently governmental*, see Vernon, "Battlefield Contractors," 376–77.

71. Blizzard, "Increasing Reliance," 8.

72. According to Lt Gen Steven Blum, chief of the National Guard Bureau, "We find ourselves, in some cases, in a bidding war for some of our most experienced soldiers and airmen." Matt Kelley, "Contractors, Military in 'Bidding War,' " *USA Today*, 31 July 2005, http://www.usatoday.com/news/world/iraq/2005-07-31-contractors-private_x.htm (accessed 17 April 2007).

73. Singer, "Outsourcing War," 129.

74. "There is a growing trend at the Pentagon to contract out intelligence jobs that were formerly done primarily by service personnel and civil service employees. . . . It should come as no surprise that many younger military and government-trained intelligence personnel, who have top security clearances, are resigning to take jobs in the private sector." Walter Pincus, "Increase In Contracting Intelligence Jobs Raises Concerns," *Washington Post*, 20 March 2006, 3.

75. *US Code*, vol. 10, sec. 2871ff.

76. Jim Garamone, "DoD's Privatized Housing Program Hits High Gear," American Forces Information Service, 16 February 1999, http://www.defenselink.mil/news/Feb1999/n02161999_9902162.html (accessed 17 April 2007). In many agreements, if privatized housing's military-occupancy rates drop below specified amounts, vacant housing may be leased to civilians with no military affiliation. This may raise substantial issues pertaining to such individuals' status, along with issues concerning commanders' obligations to maintain good order and discipline on the installation. See also General Accounting Office, *Military Housing: Continued Concerns in Implementing the Privatization Initiative*, Report to Congressional Committees, GAO/NSIAD-00-71 (Washington, DC: General Accounting Office, March 2000), 29, http://www.gao.gov/archive/2000/ns00071.pdf (accessed 17 April 2007).

77. See, for example, Gary Emery, "Civilian Guards Tapped to Control Base Gates," *Air Force Print News Today*, 19 May 2004, http://www.af.mil/news/story.asp?storyID=123007764 (accessed 17 April 2007).

78. "Military customs and courtesies go beyond basic politeness; they play *an extremely important role in building morale, esprit de corps, discipline, and mission effectiveness.* Customs and courtesies ensure proper respect for the military members and build the foundation for self-discipline" (emphasis added). Air Force Pamphlet (AFPAM) 36-2231, vol. 2, *United States Air Force Supervisory Examination (USAFSE) Study Guide*, 1 July 2005, 123, par. 7.1, http://www.e-publishing.af.mil/pubfiles/af/36/afpam36-2241v2/afpam36-2241v2.pdf (accessed 17 April 2007).

79. See generally Bush, *National Strategy for Pandemic Influenza*. For details concerning plans regarding the prospect of such a hurricane striking the New York metropolitan area, see the New York City Office of Emergency Management's guide: "NYC Hazards: Coastal Storms and Hurricanes," *NYC.gov*, http://www.nyc.gov/html/oem/html/hazards/storms.shtml (accessed 17 April 2007). For details concerning plans regarding a possible earthquake in the central United States, see the Missouri Department of Natural Resources' guide: "Earthquake Facts about the New Madrid Seismic Zone," http://www.dnr.mo.gov/geology/geosrv/geores/techbulletin1.htm (accessed 17 April 2007).

80. "Civilian rule is basic to our system of government. . . . *Military enforcement of the civil law leaves the protection of vital Fourth and Fifth Amendment rights in the hands of persons who are not trained to uphold these rights.* It may also chill the exercise of fundamental rights, such as the rights to speak freely and to vote, and create the *atmosphere of fear* and hostility which exists in territories occupied by enemy forces" (emphasis added). *Bissonette v. Haig*, in *Federal Reporter 2d*, vol. 776 (8th US Circuit Court of Appeals, 1985), 1384.

81. Adam Nossiter, "New Orleans Probing Alleged Police Looting," *Washington Post*, 30 September 2005, A10, http://www.washingtonpost.com/wp-dyn/content/article/2005/09/29/AR2005092901975.html (accessed 17 April 2007).

82. See *Bissonette v. Haig*, 1384.

83. Pres. Dwight Eisenhower warned against overreaching by a military-industrial complex:

> In the councils of government, *we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex.* The potential for the disastrous rise of misplaced power exists and will persist. We must never let the weight of this combination endanger our liberties or democratic processes. We should take nothing for granted. *Only an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals, so that security and liberty may prosper together.* (emphasis added)

"Military-Industrial Complex Speech, Dwight D. Eisenhower, 1961," *Avalon Project at Yale Law School*, http://www.yale.edu/lawweb/avalon/presiden/speeches/eisenhower001.htm (accessed 17 April 2007).

84. *Parker v. Levy*, in *Supreme Court Reporter*, vol. 94 (1974), 2547.

85. "Courts must give great deference to the professional judgment of military authorities concerning the relative importance of a particular military interest." *Goldman v. Weinberger*, in *Supreme Court Reporter*, vol. 106 (1986), 1310.

86. *Military Extraterritorial Jurisdiction Act, US Code*, vol. 18, sec. 3261ff.

87. For a listing of current members of Congress with military backgrounds, along with limited details concerning their service, see "Veterans in 108th Congress (167)," House Committee on Veterans' Affairs, http://veterans.house.gov/vetlink/vetsincongress.html (accessed 17 April 2007).

88. Michael C. Thomsett and Jean Freestone Thomsett, *War and Conflict Quotations: A Worldwide Dictionary of Pronouncements from Military Leaders, Politicians, Philosophers, Writers and Others* (Jefferson, NC: McFarland & Company, 1997), 36.

89. *Laird v. Tatum*, in *Supreme Court Reporter*, vol. 92 (1972), 2318.

Fiction

A Higher Form of Truth?

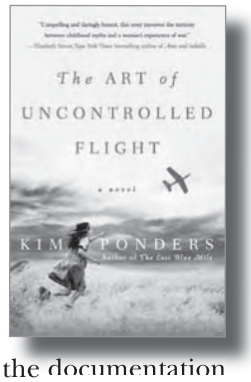
Dr. David R. Mets

The Art of Uncontrolled Flight by Kim Ponders. HarperCollins Publishers (http://www.harpercollins.com), 10 East 53d Street, New York, New York 10022, 2005, 192 pages, $19.95 (hardcover); 2007, 208 pages, $13.95 (trade paperback).

The Last Blue Mile by Kim Ponders. HarperCollins Publishers (http://www.harpercollins.com), 10 East 53d Street, New York, New York 10022, 2007, 320 pages, $24.95 (hardcover).

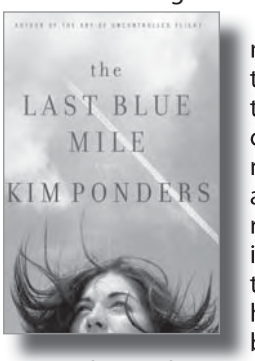
I seldom review a fictional work, and the *Air and Space Power Journal* seldom prints such essays. But *The Art of Uncontrolled Flight* is special. So is *The Last Blue Mile*—a sequel of sorts. Both are about the current Air Force, a main interest of this journal, and both are by Kim Ponders—a major in the Air Force Reserve. She graduated from Syracuse University, went through Officer Training School in 1989, and then served as a weapons controller, flying in the back end of an Airborne Warning and Control System (AWACS) early warning aircraft. She did so in various parts of the world, gaining credit for combat flying time in Operation Desert Storm during the process—one of the first women to do so. Along the line, she met her husband-to-be, Bill Ponders, also an Air Force AWACS officer; they now live in southern New Hampshire with their two children. She remains a major in the Air Force Reserve and serves as a speechwriter for its chief, Lt Gen John Bradley.

The author's first novel, *The Art of Uncontrolled Flight* proves successful. I have sometimes thought that novels can embody a higher form of truth than, say, biographies or histories. Many of us think that some concepts defy documentation—but we strongly hold them to be true by virtue of our intuitive judgment. Thus, a novelist can put them into his or her work, but the historian or biographer cannot because of the documentation issue—they cannot be proven in court. Clearly a better-than-average writer, Ponders nevertheless sometimes comes close to using purple prose. In this book, she writes largely from her own experience, which gives the novel some credibility, though whether it reaches the level of a higher form of truth remains open to question.



Annie Shaw, the heroine, has a tough childhood, living with a father who moves from lover to lover after her mother dies at a young age. She worships her father and has a guilt complex about her mother's death that complicates her journey in the Air Force. An AWACS copilot, Annie is married to a good and true man—a civilian in the petroleum industry—but falls in love with her aircraft commander. In keeping with current style in the novel business, she sleeps with him on their various travels. On their combat tour, when the commander leaves the cockpit and she has charge of the aircraft, she makes a serious

blunder, and an enemy missile hits the plane. After the crash landing, Annie is the last one to leave the aircraft, helping a male crew member extract himself in the process. Ponders does not polish the image of her heroine, ironically relating that both she and her aircraft commander receive the Distinguished Flying Cross even though their mistake caused the loss of the airplane in the first place. She also realistically depicts the media crush that makes a spectacle out of Annie's medal while ignoring that of her commander. Still, the incident leads to the end of her Air Force career and her retirement to a Texas ranch with her husband. The story is not altogether fantasy, and though the Air Force has never lost an AWACS to an accident, the idea of crew members receiving decorations instead of a deserved court-martial is not limited to the world of fiction. Not very heavy, The Art of Uncontrolled Flight nevertheless makes for fair entertainment during an evening's read.



The Last Blue Mile (the name used by cadets for the corridor leading to the Air Force Academy commandant's office) is more substantial. Many academy graduates who read this journal will be interested in a tale about their alma mater; again, however, whether this book can lay claim to a higher form of truth than histories is open to question. In this case, Ponders finds herself more removed from personal experience (since she did not attend the academy), which limits the novel's credibility in some ways. She spent a couple of weeks on site interviewing a number of people, including serving cadets. Clearly, she also gained a good deal of her knowledge of the institution from the press—which colors her work to some extent. She claims that the fact that she is not a graduate does not necessarily disqualify her from writing about the institution with authority—on the contrary, in some ways it may enhance her capability. Like Ponders, I did not attend the academy, but I lived on the campus for four years and can testify that she has most of the physical description of the place right (with a couple of possible exceptions: for most of its history, Fairchild Hall has not housed the superintendent's office, and if there are mountain sheep in the vicinity, I never saw any).

The book flows quickly. Ponders seems to capitalize on her reading of newspapers, building her story around current events starting in 2003. She focuses less on the sexual-assault scandal of that year than on the religious issue that hit the headlines a couple of years later. The story builds on assumptions that the older, conservative-Republican people who had dominated the development of the academy had come under pressure from a far-right evangelist group, the Cadets for Christian Fellowship, that threatened an extreme reaction to the events of 2003. This organization had a friend in court in the person of Col Silas Metz, the vice-commandant and a rigid martinet who answered to the commandant, Brig Gen John Waller—a conservative but flexible pragmatist and the traditional fighter pilot, himself a graduate. Presiding over them both is the first female superintendent (and the first female three-star general), Susan Long—an engineer/bureaucrat still on the march for higher rank, using as her vehicle something Ponders calls "Culture for Transformation" (evidently meant to bring to mind the "Agenda for Change," a program the Air Staff brought to the academy in reaction to the sexual-assault scandal of 2003).*

The heroine among the cadets is a Massachusetts girl, Brook Searcy—basically honest if a bit naïve. Another cadet, Paula Snowe, daughter of a senator who went to college with General Long, is not so honest and in fact emerges as the principal figure in a cheating scandal. The male cadets, for the most

*The real-world Air Force currently does have a female lieutenant general, Terry Gabreski, but the academy has not yet had a female superintendent.

part, have secondary roles in the story. One, however, a third classman by the name of Bregs, indulges in Neanderthal-like hazing of the new cadets. (The depiction of him stomping his boots on a prone fourth classman over a religious issue seems unrealistic to me though.)

The book's theme of religious conflict appears overstated—even more than in the newspaper reports of 2005 and far more than in the report of the investigators the chief of staff sent out that summer to look at the problem. Ponders makes it into a three-sided conflict with Waller arguing a principled but pragmatic approach, Metz representing the far-right evangelists, and General Long keeping a careful eye on her chances of making a fourth star by keeping a lid on the situation. Complications arise when the senator's daughter is caught cheating. General Waller wants to apply the honor code and expel her, but Long prevents that outcome—partly for selfish reasons of promotion and partly for the greater good of the feminist cause at the national level (the senator serving as an asset in the latter).

The Last Blue Mile contains a couple of explicit sex scenes, one involving General Waller and the other Cadet Searcy, that seem obligatory in today's novel market. Aside from appealing to the gallery, their purpose in developing the plots is a little unclear to me, especially the Waller case. As for Searcy, the circumstances of the incident seem somewhat bizarre but not beyond the realm of possibility. What happens to her certainly lies within the definition of sexual assault and date rape; furthermore, her reasoning in refusing to report the offense rings true and *does* help one to understand why those offenses represent the most underreported crimes in our society.

Ponders expends a number of pages on the glories of unpowered-glider flight, perhaps based on interviews, that come into play again toward the climax of the book. Our heroine-cadet, along with the senator's daughter, goes off base to a party in which bad judgment causes the consumption of too much liquor. One of the two male cadets who accompanied them crashes a glider the next day, and the autopsy reveals alcohol in him, resulting in much grief all around.

The climax itself involves both Searcy, in an unauthorized soaring flight that endangers her survival, and General Waller, who dashes after her in a powered glider. I'll leave it to those who read the book to discover whether he prevents her from following her classmate to the grave in a mountain crash.

What, then, are the messages of *The Last Blue Mile*? One, I suppose, conveys that officer education is no cakewalk. The young have minds of their own. Politics are important. Personal ambition is alive and well. Another theme suggests the existence of a built-in contradiction between the Air Force's need for technical specialists and the requirement for warriors. Still a third implies a need for an honor system—one not always observed (at several levels). Maybe one can capture all of this in the idea that an eternal conflict exists between traditional values (some of which are valid) and modern ones (some of which are also valid). Unhappily, the author's tendency to lapse into diverse descriptive excursions that do not seem to have a direct connection to the development of these messages detracts from the work.

Why should a warrior-scholar bother with this novel? Granted, it offers an evening's entertainment. But beyond that, academy graduates will not find much that is new to them and will also judge parts as unrealistic—not a higher form of truth. Those who did not attend should exercise caution because of the novelist's need to exaggerate in order to build drama—and to use popular stereotypes to do so (also not really a higher form of truth). Ponders's first book, *The Art of Uncontrolled Flight*, is preferable because it more closely reflects her own experience. Readers seeking a realistic view of the academy would do better with a history such as George Fagan's *The Air Force Academy: An Illustrated History*. Although a coffee-table book and somewhat dated, it nevertheless offers proper documentation and a candid treatment of such events as the cheating scandal of 1965 and the integration of women. Those seeking entertainment along with military insight should consult the huge list of military fiction that would provide more help than the present work. C. S. Forester, a

favorite of mine (*Captain Horatio Hornblower*, *Sink the Bismarck*, etc.), covers more than the naval aspect of things. The American Civil War offers a great set of works—Stephen Crane's *The Red Badge of Courage*, for example. Readers who want fiction that involves airpower need only turn to World War II, which yielded a vast, worthy literature—such as John Hersey's *The War Lover*. In the end, though, one must conclude that *there is no higher form of truth*—higher truths perhaps, but all views, whether from the likes of Ponders or Fagan, can never be more than approximations of the truth. Again, we recall the blind men, sent out to examine and report on an elephant, who produce different descriptions—all of them true and none of them the whole truth. Some are better approximations than others, but none are perfect. In their study of war, aspiring air warriors can only hope to make their professional reading program inclusive by studying as many diverse descriptions of war as possible, thus moving their own approximations a little closer to reality. ❑

Effects-Based Information Battle in the Muslim World

Remy M. Mauduit

IMMEDIATELY FOLLOWING THE terrorist attacks of 11 September 2001 in the United States, Western political leaders and policy makers were quick to recognize publicly that Islam and the majority of its followers were not to blame for the violence. Liberal scholars inside and outside the Muslim world proffered intellectual arguments that supported liberal, tolerant Islam. In spite of such efforts, the indiscriminate use of terms such as *fanaticism*, *terrorism*, *fundamentalism*, *Islamism*, and *jihadists* by Western leaders and the media has led, at best, to confusion and has helped suggest that terror and Islam are one and the same.

Exacerbating the already-charged communication environment, the terrorists' rhetoric asserted that their mission and methods were mandated directly by Islamic tenets. Early attempts to demonize Osama bin Laden only increased his stature and perceived power among his followers. In a sense, Western political and, subsequently, media dialogue unwittingly created a "David and Goliath" image of bin Laden standing toe-to-toe with the most powerful man on earth, the president of the United States, giving al-Qaeda exactly what it wanted—global exposure and inflated notoriety. Religious legitimacy became a vital enabler for rallying public support and action in support of bin Laden's (or any other charismatic extremist's) "global jihad."

Contemporary Islam is in transition, engaged in an internal and external struggle over its values, identity, and place in the world. Rival sects are contending for spiritual and political dominance.

For some, Islamic rhetoric became an instrument of mobilization, serving as a cover for nationalist, anti-imperialist, and reformist objectives. However, it also had a social component, including denunciations of the injustices, corruption, and tyranny that have characterized the reigning oligarchies in the Islamic world. Islamism thus became one of the few available outlets for effective protest and action.

Generalizations about the various Islamic movements and parties have caused confusion and ignore significant distinctions among the groups. Islamic political parties are, in fact, quite dissimilar, often having nothing in common other than references to the Prophet and Islam, which they interpret in a number of conflicting or contradictory ways that span the political spectrum from left to far right. Thus, dangerous misunderstandings are inevitable when people talk about "fundamentalism."

We see the depths of Muslim despair in the trend to rally behind any Muslim who appears powerful and, most importantly, who challenges America's power. This form of adulation is largely without moral scruple, as exemplified by the widespread support of Saddam Hussein, a most unscrupulous and anti-Islamic leader, and bin Laden, a self-admitted mass murderer who contemptuously disregards all Islamic prohibitions on killing innocent noncombatants. Such is the conflicted state of disillusionment, humiliation, and desperation

throughout the Islamic world today—the breeding ground for terrorists.

One of America's most difficult challenges in the war on terrorism concerns the information battle now waging in the Islamic world. To mitigate these challenges, we must separate Islam from terrorism in Muslims' consciousness. Therefore, it is critical that US political, business, cultural, and religious leaders and their spokespeople refrain from framing terrorism in an Islamic religious context.

We could take a first step by establishing within the Department of Defense a permanent Islamic Information Center chartered to assess, develop, disseminate, and coordinate information to the international Muslim public. The main long-term objectives of this center would entail contributing to the promotion of democracy, good governance, freedom, and human rights in the Muslim world. Democracy will open the door for reinterpretation of Islamic sacred texts based on the needs, conditions, and priorities of Muslim societies in the twenty-first century. Interagency collaboration, coordination, and integration are keys to this strategic-communication approach.

In the short range, we should assess the capability of the United States Air Force to support this center by developing informational programming and broadcasts aimed at a large segment of the world's Islamic public. Repetitive broadcasting of various humanitarian missions to the predominantly Muslim world would serve as a springboard for more ambitious endeavors. Such activities would complement growing Air Force involvement in the cyber domain.

Key information objectives/themes for the first phase of the center could include

- actively promoting the values of freedom by supporting civil-society institutions, both local and regional, that are working to promote and defend democracy;
- supporting both secularists and moderate Islamists who renounce violence and advocate democracy, freedom, and equality for all citizens;
- focusing on young people, pious traditionalist populations, Muslim minorities in the West, and women;
- educating people, Muslims and non-Muslims alike, on the critical questions related to the compatibility between Islam and democracy;
- discrediting extremist ideology and delegitimizing individuals and positions associated with extremists by challenging their interpretation of Islam, exposing inaccuracies, revealing their linkage to illegal groups and activities, and publicizing the consequences of their violent acts; and
- promoting divisions among extremists by, among other things, encouraging journalists to investigate issues of corruption, hypocrisy, and immorality in extremist and terrorist circles.

The Air Force doctrines likewise must be flexible at all times and entirely uninhibited by tradition.

—Gen Henry H. "Hap" Arnold

One Day Too Long: Top Secret Site 85 and the Bombing of North Vietnam by Timothy N. Castle. Columbia University Press (http://www.columbia.edu/cu/cup), 61 W. 62nd Street, New York, New York 10023, 1999, 368 pages, $73.50 (hardcover); 368 pages, $21.00 (softcover).

Dr. Timothy Castle's book *One Day Too Long* chronicles an example of the difficult decisions the military makes in times of war and the consequences of faulty decision making. In the 1960s, when senior Air Force leadership decided to locate a ground-based radar site within Laos (only 20 miles from the North Vietnamese border), it acted upon several assumptions. First, since the location, named Site 85, would allow all-weather bombing of Hanoi, the leaders of Thirteenth and Seventh Air Forces believed—as did the all-volunteer crews manning the site—that it would help shorten the Vietnam War. Second, both military and embassy leaders felt that they would have ample time to evacuate the site in the event of attack (which they knew would eventually occur). Third, the Air Force assumed it could successfully execute all aspects of the mission "under radar," even after the site's evacuation. As in all Laos-based operations, "plausible deniability" would cover a host of secret sins.

Unfortunately, all three assumptions turned out to be false. As Dr. Castle meticulously documents, the site quickly turned from focusing on Hanoi to directing its efforts toward the enemy troops massing in the valleys below the mountaintop site. He also shows, in stark detail, that both Air Force leadership and the US ambassador to Laos bungled the evacuation, holding fast to the belief that evacuation was unnecessary even after the attack began. (In their defense, even the men at Site 85 didn't seem too concerned by the initial mortar attack launched by the Vietnamese and Pathet Lao.) Finally, Dr. Castle writes of the ultimately unsuccessful attempts by the Air Force to deliberately misrepresent the truth of what happened at Site 85 to the families of the 11 men still missing and unaccounted for to this day.

The decisions made by our leadership often favor larger goals at the expense of individuals. Military members make sacrifices freely, understanding that they serve at the behest of their commanders. But when the Air Force can show no greater gain to balance out the loss of the individual, we must ask why any sacrifice is warranted.

Gen Ronald R. Fogleman, former Air Force chief of staff, notes in a dust-jacket blurb that the loss of Site 85 "should be a subject for mandatory study in our professional military education system." He is correct, and the more junior the officer reading *One Day Too Long*, the better. By instilling in our ranks a sense of shock over the problems that Dr. Castle squarely faces, hopefully this book can prevent such a tragedy from happening again.

Mr. Glenn Leinbach
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Red Tail Captured, Red Tail Free: The Memoirs of a Tuskegee Airman and POW by Lt Col Alexander Jefferson, USAF, retired. Fordham University Press (http://www.fordhampress.com), University Box L, Bronx, New York 10458, 2005, 133 pages, $29.95 (hardcover).

There tends to be something special about memoirs and the recollections of the men and women who actually participated in the history-making events that we, unfortunately, are only able to read about. When I saw *Red Tail Captured, Red Tail Free*, I jumped at the chance to review this book. It is written by Lt Col Alexander Jefferson, USAF, retired, a Tuskegee Airman. What makes this book so special is not necessarily his wartime exploits as a fighter pilot, but the telling of his journey to be-

come a Tuskegee Airman. Even more intriguing is that he was shot down, captured, and had the opportunity to spend nine months as a guest of the German Reich as a prisoner of war. To date, there has been very little written on the experiences of black prisoners of war during World War II.

Red Tail Captured is written in a very unassuming format that is easy and enjoyable to read. Many books of this nature, like *I Flew for the Fuehrer* by Heinz Knoke, one of my favorite wartime accounts, tend to be somewhat heavy handed in an attempt to lead the reader in a certain direction or espouse a certain political point of view. Alexander Jefferson does neither. In his discussions about growing up in Detroit, the author puts the reader at ease, almost as if he were talking to an old friend. But with any historical topic that continues to be written about, the question arises as to the book's utility and/or importance to the subject. Although it is a good memoir, I am somewhat ambivalent regarding its historical relevance.

Readers looking for a wartime history of a Tuskegee pilot with a detailed synopsis of each of his sorties should look elsewhere. In fact, this book lacks many of the items found in many of the best historical studies. For example, it would have been nice if the author had written more on the 18 missions he completed before being shot down on his 19th. Likewise, there are relatively few wartime photographs of the author, the men of the 332nd Fighter Group, or the aircraft they flew. Although I can distinguish a P-40 from a P-51 or an Me-109 or an FW-190, some people cannot, and it would have been nice to see photographs of those aircraft. Likewise, any time I read a historical manuscript that describes distant places, I consider it essential to have maps of the area or theater of operations. Although the author talks about his base in Ramitelli, Italy, and several places in Germany, without a map, it is difficult to get an idea of where he is actually talking about. Hopefully if there is a second reprinting, it will include these items.

The author does, however, bring to light many other fascinating stories such as his treatment and life as a *Kriege*—a prisoner of war. It was interesting to know that at no time was he, as a black man, mistreated by the Germans. I found that to be rather significant considering many of the more ardent German views on race at the time. Although *Red Tail Captured* contains precious few photographs, what the book does have in abundance are the drawings the author made while overseas. A rather accomplished sketch artist, the author fills the book with dozens of these excellent drawings. It is in these drawings that Alexander's story is brought more vividly to life.

Overall, I liked *Red Tail Captured, Red Tail Free.* Although not the best aviation book on the Tuskegee Airmen—arguably not this book's purpose—Jefferson's memoir is an honest and fresh look at one man's personal journey through life before, during, and after the war. It is more than a story about a pilot who flew P-51s against the Germans; it is about a man—at a time in American history when blacks were expected to fail—who overcame all obstacles and graduated from college with degrees in chemistry and biology, fought for his country, and then led a life teaching and mentoring others. This memoir is truly a credit to this man and remains a worthwhile read. Although I consider this memoir important for anybody interested in this area of history, $29.95 may be quite a large investment for a book without photographs, maps, charts, or more detailed descriptions of combat missions flown. Hopefully Fordham University Press will publish a second edition and turn it into a much more affordable paperback. It is regrettable that the steep price tag will likely push some readers away from purchasing this book.

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Lockheed's SR-71 "Blackbird" Family: A-12, F-12, M-21, D-21, SR-71 by James Goodall and Jay Miller. Midland Publishing (http://www.ianallanpublishing.com/catalog/index.php?cPath=480), Riverdene Business Park, Molesey Road, Hersham, Surrey KT12 4RG, 2002, 128 pages, $24.95 (softcover).

Is this book worth your time? Yes, and here's why. *Lockheed's SR-71 "Blackbird" Family* is a well-written and well-documented work containing a military story that will fascinate the casual reader, inform the Air Force reader, and enrich the aviation-history buff—and the many excellent pictures of jets will hold the interest of every aircraft enthusiast. Authors James Goodall and Jay Miller offer a detailed review of an exciting period of US history—specifically, one element of America's military strength during the Cold War—distinguished by one of this country's greatest series of production aircraft: Lockheed's Blackbird family, consisting of the A-12, F-12, M-21, D-21, and SR-71. The ability of the American industrial base to produce such a tremendous technical marvel as the A-12/SR-71 speaks

volumes for US design ingenuity, engineering skill, and manufacturing capability from the 1950s through the 1970s. Correspondingly, the military's determination to fly such aircraft during the Cold War reflects the world situation and military strategy at that time.

This book tracks the development history of the entire family of A-12/SR-71 air vehicles, beginning when political and military leaders decided that the U-2 would soon need to be replaced. The text discusses the various early designs for a follow-on aircraft to this reconnaissance air vehicle—a replacement that needed to defeat a growing threat from Soviet ground-to-air missiles. The authors describe the competition between Convair and Lockheed to win the government contract to build this new aircraft, which had to fly faster and higher than any previous production jet. The section highlighting the manufacturing phase of the winning entry—the A-12—includes the design of the aircraft, its early testing, and considerable discussion on selection of the all-important engines, which propelled the platform to speeds in excess of Mach 3 and altitudes above 90,000 feet. Another exciting portion of the book describes the operational experiences of the CIA's A-12 deployment and operations from Kadena AFB, Japan, during the 1960s.

Intermingled with the major technological sections on engines and flight characteristics is a slight but rather important discussion of the acquisition and political strategy within the power halls of several federal agencies and departments in Washington, DC, and Strategic Air Command. The authors also examine the decision to terminate the A-12 CIA air vehicle just one year after its initial operational mission in favor of a fleet of SR-71s procured and operated by the Air Force. These insights present the reader with other dimensions of airplane production that make this work a must-read for anyone interested in aviation. Other topics include the interceptor version of the A-12 air vehicle as well as development of the Mach 3 drone—the D-21—launched from both a derivative of the A-12 (called the M-21) and from one of two specially modified B-52H aircraft.

I found the final section, which focuses on the SR-71's history of flight operations, extremely interesting. Goodall and Miller cover the history, construction, and operational use of the SR-71, which served the nation for over 25 years, in sufficient detail to satisfy the most ardent aviation reader. Of special note is the information concerning the onboard sensors and especially the workings of the J-58 Pratt and Whitney engines, which performed in subsonic, transonic, and high-Mach regimes. Readers also learn about Pres. Lyndon Johnson's announcement in the open press of the aircraft's existence, the individual who attained the most flight hours in the SR-71, the termination of the program, and the final disposition of all aircraft (A-12, YF-12, and SR-71) as well as the D-21 drone.

Although the authors do not include a description of what an SR-71 flight was really like (I flew the aircraft at Beale AFB, California, from 1982 to 1986, accumulating 500 hours), they do a wonderful job of telling the story of the Blackbird's family. Anyone who enjoys reading about aviation history will find this book rewarding.

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Divining Victory: Airpower in the 2006 Israel-Hezbollah War by William M. Arkin. Air University Press (http://www.maxwell.af.mil/au/aul/aupress), 131 West Shumacher Avenue, Maxwell AFB, Alabama 36112-5962, 2007, 356 pages, $30.00 (softcover). Free download from http://www.maxwell.af.mil/au/aul/aupress/Books/Arkin/ArkinDownload.html.

Two pernicious myths have emerged from Israel's campaign against Hezbollah in southern Lebanon in the summer of 2006. The first is that Israel indiscriminately bombed civilian population and infrastructure. The second is that Israel failed to defeat Hezbollah because it chose airpower as its principal military instrument. William Arkin, the well-known independent military analyst, explodes both myths in his new book, *Divining Victory*.

With respect to the first myth, Arkin cites the United Nations Commission of Inquiry on the campaign, which noted "a significant pattern of excessive, indiscriminate and disproportionate use of force by the IDF [Israeli Defense Force] against Lebanese civilians and civilian objects." (See *Report of the Commission of Inquiry on Lebanon Pursuant to Human Rights Council Resolution S-2/1* [New York: United Nations, General Assembly, 23 November 2006], 3, http://www.ohchr.org/english/bodies/hrcouncil/docs/specialsession/A.HRC.3.2.pdf.) However, Arkin shows, with meticulous documentation, that the Israelis were very discriminate in their target selection. They decided, for example, to avoid striking the Lebanese electrical power grid and hit civilian residences only in known Hezbollah enclaves that could be directly linked to Hezbollah military capabilities. That this broke down

during the last few days of the campaign, when Israel sowed large parts of southern Lebanon with cluster munitions, was more a reflection of Israel's blindly growing sense of strategic frustration than part of a consistent effort to deliberately inflict civilian damage. Arkin clearly shows that the Israelis conducted very discriminate target selection, even if the targets they selected did not support Israel's ultimate, intended end state in a logical manner.

With respect to the second myth, Arkin points to a school of thought in which "an 'effects-based' operations mind-set and what IDF theorists call 'cognitive' objectives rather than conventional approaches of attrition and 'destroying' the enemy . . . led to the 'aerial arrogance' on the part of many senior IDF officers." However, he maintains that "to equate an effects-based approach with aerial arrogance is a mistake" (p. 154). Arkin goes on to point out that Israel conducted almost the antithesis of an effects-based campaign, taking "the most conventional of approaches" geared to destroying Hezbollah's fighting ability on the ground in ways "almost divorced from the overall campaign objective and desired strategic outcome," especially in southern Beirut (p. 155). Effects-based theory and doctrine maintain that the desired end state and objectives should drive all subordinate considerations. Arkin demonstrates how this did *not* happen in the Israel-Hezbollah campaign.

More importantly, the book examines the larger question of why Israel failed to achieve victory in a conflict that pitted a modern, Westernized nation with a military built along US lines against an unconventional terrorist enemy embedded within an indigenous civilian population. Arkin maintains that Israel went about the campaign in a fundamentally wrongheaded way. An approach based on end-state considerations devolved into an exercise in servicing a set of targets selected for what commanders considered immediate military advantage. Especially in southern Beirut, Israel ignored the strategic-communications battle being waged successfully by Hezbollah, which made each military gain seem like a direct attack on innocent civilian targets. Israel came under much criticism for not committing itself to a more aggressive effort on the ground. Arkin counters that a large ground invasion involving more troops might indeed have produced a different outcome, but without any guarantee that such an effort would have resulted in decisive victory, fewer political problems, fewer casualties, and less civilian destruction. Indeed, the Israelis invaded and occupied southern Lebanon from 1982 to 2000 and emerged from that conflict with an enemy that entrenched itself more firmly there than their enemies had been in 1982. Invasion and more forceful action on the ground were far from a panacea.

So what would it have taken for Israel to have come out better in this campaign? Arkin suggests that

> since Israel was not going to "win" the war against Hezbollah through statistical accumulation and was not going to fight Hezbollah to some total war victory, an equal objective had to be . . . also creating some degree of sympathy and support for Israel's right to defend itself. . . . Had Israel . . . concentrated its resources on military forces and capabilities in the south and the Bekaa [Valley], had it pursued a campaign more attuned to emerging humanitarian and international norms regarding the use of cluster bombs, had Israel shown greater transparency in describing what it was doing and the intelligence basis for its decisions . . . it might have—might have—bought more time and engendered greater sympathy . . . thus not only achieving more militarily, but also in the fundamental long-term objective of counterterrorism: not creating even more enemies tomorrow (p. 157).

Divining Victory is chock full of primary documentation, tables of organization and equipment, target lists, and lists of damage inflicted (taking up nearly half the volume). Whether one agrees with its conclusions or not, it will serve as the most complete independent source of data on the campaign for some time to come. For this as well as for its admirably objective analysis of what went wrong with Israel's thinking about the war, this book will be an invaluable addition to the library of airpower practitioners and of anyone interested in the challenge of using modern conventional military power to fight terrorism.

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Where Are the WMDs? The Reality of Chem-Bio Threats on the Home Front and the Battlefield by Al Mauroni. Naval Institute Press (http://www.usni.org/press/press.html), 291 Wood Road, Annapolis, Maryland 21402-5034, 2006, 272 pages, $28.95 (hardcover).

At the outset of his book, Al Mauroni announces that "he has a reputation . . . for sounding off with brash observations and untested concepts" (p. xi). This is not exactly the preferred intellectual foundation for a solid analytical work on a complex, contentious, and highly technical topic. However, with a wide range of practical experience and solid

credentials, Mauroni appears well suited to this task of explaining chemical, biological, radiological, and nuclear (CBRN) policy development and implementation. A former member of the Army Chemical Corps, he has served as a consultant to the Joint Staff as well as the Office of the Deputy Assistant Secretary of the Army for the Elimination of Chemical Weapons and has published a number of books and articles on the subject. Thus, *Where Are the WMDs?* reflects Mauroni's detailed knowledge of how the Department Defense (DOD) develops and implements counterproliferation policy and consequence management as well as the operational details of defending our military forces against CBRN threats.

Consequently, this is not the television series *24*. Readers will not find a Jack Bauer archetype between these covers chasing terrorists and other evildoers. Instead, they will find conscientious midlevel policy makers, program managers, and operational planners navigating the DOD's bureaucratic labyrinth in an effort to define a diffuse mix of CBRN threats, set priorities, and design a useful mix of policies, plans, and programs to protect our military forces as well as the homeland.

This bureaucratic tour d'horizon may not be exciting, but it reflects the essential business of strategy development, coordination, and implementation. It is within our national security bureaucracy that the ends (objectives) of national strategy are sliced, diced, strained, and turned into ways (policies) and means (resources). Although a bit unwieldy at times, *Where Are the WMDs?* will help the diligent reader understand how we got to where we are today and, by providing a road map for understanding the bureaucratic labyrinth, thus avoid roadblocks and culs-de-sac. Therefore, although this book is not for everyone, it is a necessary read for anyone involved in developing policies, crafting operational plans, and providing the resources to deal with CBRN threats.

The author introduces the overarching theme in the first chapter when he correctly asserts that the "very term 'WMD' [weapon of mass destruction] has lost any definable parameters that would make it useful for public discussions" (p. 17). "WMD" has indeed become a meaningless bugaboo that frightens the public, obviating analytical rigor and useful risk assessment. Not all threats are equal, and not all unconventional weapons are WMDs. The qualitative and quantitative differences in the range of unconventional CBRN threats packed under the WMD rubric are vast, and each threat presents unique development, deployment, and employment challenges to our adversaries, thus presenting us a range of defensive challenges. For example, vast differences exist among the detonation of a 10-kiloton nuclear weapon in a major American city, an anthrax attack on the scale of what occurred in 2001, and the use of a persistent nerve agent against deployed forces. Mauroni correctly concludes that the United States has a "genericized" counterproliferation strategy that does not make useful distinctions among the range of threats, the defense of the homeland, and military operations (p. 100).

The analytical point of disaggregating the WMD threat is to allow the United States to set clear national counterproliferation priorities for the homeland as well as our military forces and decide what constitutes acceptable risk. This is the crux of the threat assessment and resource-allocation dilemma facing senior policy makers. Unfortunately, the author, despite offering a number of sensible bureaucratic adjustments to our CBRN policy-development process, never steps up and actually offers his assessment of what our national priorities should be and where we should accept risk. His thoughts on this difficult policy question would have added great value to his analysis.

Mauroni's discussion of the intelligence failure concerning WMDs in Iraq is equally unsatisfying. In regard to the intelligence community's now-notorious national intelligence estimate (NIE) titled *Iraq's Continuing Program for Weapons of Mass Destruction* (October 2002), Mauroni states that the report was "intended not to inform the president . . . but to convince Congress that there was a credible threat" (p. 121). Although perhaps an inadvertent slip of the author's pen, this suggestion that the NIE was designed to convince Congress of the Iraqi threat implies that the intelligence community deliberately skewed intelligence on Iraq's WMD program to support a policy end. The facts do not support this implication. The NIE represented a catastrophic analytical failure but not a deliberate attempt to tailor intelligence.

However, anyone who thinks that the military did not genuinely believe that Iraq had the capability to employ chemical and perhaps biological weapons needs to review US Central Command's detailed preparations, expertly explained by Mauroni, in the months and days leading up to Operation Iraqi Freedom. One of the great strengths of his book, along with the understanding of bureaucratic organizations and processes, is its depiction of the details of counterproliferation at the operational level of war. Joint planners preparing to deploy forces into an area of operations with potential chemical and biological threats would be well served

by reading chapter 6, "Operation Iraqi Freedom," and chapter 8, "Lessons Learned."

In sum, this is a valuable work with virtues as well as flaws that perhaps tried to accomplish too much. A book with a split personality, *Where Are the WMDs?* is strong in its understanding of the CBRN bureaucracy and operational-planning considerations but weak in its appreciation of the strategic context of policy development or in its provision of useful threat assessments.

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I Want You! The Evolution of the All-Volunteer Force by Bernard D. Rostker. RAND Corporation (http://www.rand.org/pubs), 1776 Main Street, P.O. Box 2138, Santa Monica, California 90407-2138, 2006, 832 pages, $48.50 (hardcover), $68.50 (hardcover with DVD).

I Want You! is an exhaustive, ground-breaking study that explores this nation's transition from a conscripted military to an established, all-volunteer force that continues today despite three decades of opposition and economic pressures. Words hardly do justice to the thoroughness of Bernard Rostker's research. He has produced an impressive work of scholarship for the serious student. Not just a lengthy narrative, it is a well-organized and well-written study backed up by 2,300 primary documents. The notes in the print version are more than sufficient to support the text. However, the DVD version is much more useful and well worth the extra expense. Not only can readers perform searches of key words and phrases but also they can avail themselves of direct links to 1,700 of the 2,300 sources.

Some readers may be surprised to learn that conscription is not the norm in American history. Only in 35 of America's 230 years—spanning the Civil War, World War I, World War II, and the Cold War—has the nation used conscription to raise and maintain the military. The 18-month period of volunteerism that followed World War II was replaced by a 25-year draft that became increasingly unpopular because of its inconsistent application. In the 1960s, for a variety of reasons, people began to view the draft as an involuntary tax upon a small minority of young men of draft age. Discussions and studies about how to end the draft and implement a volunteer force began to gain momentum in the decade before 1973. Some studies indicated the desirability of an all-volunteer force, but most concluded that the time (i.e., the political climate) just wasn't right.

Not until presidential candidate Richard Nixon stated his intention to end the draft did these discussions move to the mainstream. Once elected, he pushed the measure to fruition despite strong opposition. The coalition of opponents included military leaders, politicians, and influential civilians of all political persuasions. One of the most strident points of opposition, as expressed by Senator Edward Kennedy (p. 95), emphasized the false concern that an all-volunteer military would leave our national defense on the shoulders of a mercenary force of poor and minorities while the elites reaped the benefits of American citizenship. Young congressman Donald Rumsfeld became an early proponent of the all-volunteer force (p. 35).

The success of this force was not a foregone conclusion. The first decade of its existence proved especially hard. Economic woes and the Vietnam syndrome played havoc with the armed forces. The post-Vietnam military had become hollow. Standards were generally low, and pay was poor. Excessive inflation quickly overtook an initial, significant boost in military pay. The cutting of recruiting budgets during an upturn in the economy made it harder to entice quality young people in a competitive labor market. By 1980 the situation had become so bad that even Nixon suggested a return to the draft. A concerted effort on all fronts, under the leadership of Pres. Ronald Reagan, however, brought improvement. Victory in the Cold War and the Persian Gulf justified the all-volunteer force. Those successes were soon threatened in the 1990s by a 25 percent drawdown of the military and a robust economy that again drew quality recruits away from the military. Today, the all-volunteer force faces unprecedented stress, and one regularly hears the call for reinstitution of the draft—albeit most frequently from individuals pushing a larger political agenda. Even so, while the services struggle to recruit sufficient numbers, retention rates remain stable despite the dangers of the current global war on terrorism.

Despite the all-encompassing nature of this book regarding the technical establishment and maintenance of the all-volunteer force, it fails to address some larger sociological questions. Granted, they do not fall within the purview of the study, but one should mention them in the interest of full discussion. Regardless of the success of an all-volunteer force, it raises the question of whether every citizen has a moral obligation to participate in his or her own defense and whether that obligation should be established by law. We live in a nation where fewer than

one in 100 citizens serves his or her country. America is at war, but our leaders fail to make the case that war requires sacrifice by all of its citizens. Some worry about a growing gap—a chasm perhaps—between the American military and the society it defends.

Kathy Roth-Douquet and Frank Schaeffer address this question in *AWOL: The Unexcused Absence of America's Upper Classes from the Military—And How It Hurts Our Country* (2006), maintaining that the elites not only absent themselves from service but also actively discourage service by themselves and others like them. They suggest that we are moving toward the very force that early opponents of the all-volunteer force feared—one made up mostly of lower-income and minority Americans. Dr. Rostker simply notes that elites traditionally don't participate in national defense and have done so only during those times of national emergency like the Civil War and World War II. Nevertheless, his book does not address our current environment of elites' avoidance of military service, exacerbated by active discouragement, or comment on whether that should affect the all-volunteer force.

Even so, I highly recommend *I Want You!* to anyone with a deep curiosity about our professional military. Even though volunteerism is the American norm, we must consider the all-volunteer force an experiment whose outcome remains uncertain, as does Dr. Rostker: "Is the all-volunteer armed force sustainable? Only time will tell" (p. 756).

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Twilight Warriors: Covert Air Operations against the USSR by Curtis Peebles. Naval Institute Press (http://www.usni.org/press/press.html), 291 Wood Road, Annapolis, Maryland 21402-5034, 2005, 352 pages, $29.95 (hardcover).

Despite the subtitle, *Twilight Warriors* covers more than air operations against the Soviet Union. Spanning the entire Cold War, it is methodically researched and, for the time being, serves as the authoritative text on these activities. Curtis Peebles, author of seminal Cold War and intelligence texts, has assembled much data and background for this quick-flowing study. It opens at the end of World War II in Europe, when Britain and the United States, wishing to obtain intelligence on the Soviet Union, used former German agents in Eastern Europe and resistance groups in the Baltic region (Lithuania and Estonia) as well as the Ukraine to obtain fragments of data. These groups were resupplied and infiltrated by air using refugees and displaced personnel flying C-47s. Through good research, Peebles lays out why the West used the tactic of air infiltration, explaining that other forms of spying had not worked in totalitarian Russia. These insights and additional data allow the reader to understand why either the Air Force or CIA and its predecessor organizations used certain aircraft or groups to run covert air operations around the world.

Peebles quickly moves from crisis to crisis during the Cold War in Albania, Korea, China, Tibet, Guatemala, and Cuba. Aircraft, deniability, and American ingenuity shape each account. Air Force readers will see how changes in Air Staff thinking on special operations formulated the size, scope, and aircraft of each decade as the service struggled to support global covert operations. Strategic Air Command developed and practiced extensive plans to retrieve pilots and aircrews in the event of a nuclear strike on the Soviet Union. DC-4s, C-47s, C-46s, and B-17s played a significant role. As the retrieval of covert personnel became a requirement, the CIA developed the gear and mechanisms for inflight recovery. (Some older Air Rescue Service personnel will remember the Fulton recovery yoke on the front of HC-130 aircraft.) During the 1950s, the CIA and its front companies perfected techniques to retrieve agents from denied areas. The recovery technique was also used to allow naval intelligence teams to exploit Russian polar-research stations on ice floes in the early 1960s.

The postindependence Congo of the 1960s saw numerous operations fronted by Cuban and American airmen. Casualties started to pick up as risks continued to grow. The B-26K, the standard covert air-operations bomber, also saw extensive service in the Congo. Although air operations take the forefront, Peebles includes an explanation of why they were required as well as compromises and losses suffered in the struggle against Communist powers in the Cold War. A description of British traitor Kim Philby sheds new light on his importance to the KGB since his activities compromised CIA and Air Force operations, leading to the deaths of thousands.

The most extensive chapter is devoted to Southeast Asia. After the Bay of Pigs operations, the CIA came to the conclusion that future presidents would not give it any airpower; consequently, the agency set up an airline, Air America, to conduct covert air operations. From the 1950s to the 1970s, Air America supported the struggle against North Vietnam and other Communist groups in the region. The mistakes made by the agency and others that ran agents and set up covert activities resem-

bled those made in the 1947–48 time frame against the Soviet Union. The stories of Lima Site 85 in Laos closely mirror operations in the early 1940s that needlessly cost people their lives. Although threat perceptions and the lack of experienced personnel can excuse early Cold War activities and losses, the same does not hold true for the Vietnam years. Clandestine air services provided critical services throughout the Cold War.

Twilight Warriors offers the right mix of scholarship, archival details, and spy stories to appeal to every reader. The Air Force's support of covert air operations in 50 years of war is worthy of a separate study at some point in the future.

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With the Possum and the Eagle: The Memoir of a Navigator's War over Germany and Japan, North Texas Military Biography and Memoir Series no. 2, by Ralph H. Nutter. University of North Texas Press (http://www.unt.edu/untpress), P.O. Box 311336, Denton, Texas 76203-1336, 2005, 368 pages, $29.95 (softcover).

Memoirs are usually interesting and almost always as weak on historical underpinnings as are the works of journalists. The general practice is to cite just enough sources to cover one's backside or to fill in the blanks—find a readable volume on the battle-of-anywhere to flesh out those memories of being pounded by antiaircraft fire while trying to hold the plane steady enough to drop a load of bombs into who-cares-where. Unsurprisingly, the bibliography is a scant two pages.

Author Ralph Nutter had an interesting war. He might well have had a short war because his first plane drew the backside of the B-17 formation and went down early (the crew spent the war in a German POW camp), but by then he was navigator in Col Curtis LeMay's lead bomber. Was that better? The attrition rate for bombers flying over Germany in daylight without fighter escort in 1942 and 1943 was so high that, statistically, it was nearly impossible to complete a tour without injury or death.

Nutter was lucky, extremely so, but he was also skilled at his profession, which allowed him to move into a relatively sheltered position—but not until after he had finished more than his full complement of missions as group navigator under LeMay in Eighth Air Force over Europe. His move was not really all that sheltered because he volunteered for Pacific duty with Brig Gen Haywood Hansell in Twentieth Air Force. As head navigator for Hansell's B-29s, he was adviser to the commander and head of navigator training. Although finished with combat flying, he served in a war zone rather than taking the fully safe option of heading stateside. There is a touch of patriotic sacrifice in that choice that sounds a different tone not all that common—or at least not advertised—today. Nutter pursued a career in law after the war, retiring as a presiding judge after 55 years. He began his memoir when former members of his unit began dying; by the time he finished, few were left.

Although the author uses few secondary sources, he does have the advantage of having experienced what he writes. Additionally, he took time during his research to get in touch with LeMay and the others who feature in his story. After all, *With the Possum and the Eagle* is a memoir—not a defining history of this or that. Although a cut above the norm, it will not win any Bancroft Prize for history.

The book might wake up a few old-timers though. At a level beyond the mere "what I did in the war," Nutter takes pains to delineate the debate over high-altitude formation bombing and addresses the controversy over firestorms generated by American incendiaries in civilian areas, particularly Tokyo. He uses as foils for this discussion two of the men he served under—Hansell and LeMay. One was unable or unwilling to abandon high-formation, target-specific bombing even as it repeatedly demonstrated its unworkability. The other made the transition and came as close as anyone to proving that bombing alone can defeat an enemy.

Nutter has either a really good memory or a really good diary. He balances discussion of missions and meetings with the telling anecdote—touching or humorous but never inappropriate. This relatively small volume is easy to read, pleasurable, and informative. It may not warrant inclusion on every warrior's bookshelf, but it does deserve at least a couple of hours of attention.

Dr. John H. Barnhill
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American Defense Policy, 8th ed., edited by Paul J. Bolt, Damon V. Coletta, and Collins G. Shackelford Jr. John Hopkins University Press (http://www.press.jhu.edu), 2715 North Charles Street, Baltimore, Maryland 21218-4363, 2005, 496 pages, $60.00 (hardcover), $35.00 (softcover).

American Defense Policy is a collection of articles from individuals with distinguished educational backgrounds who serve in key positions within the government and private sector. The book addresses both the process and content of defense policy.

Part 1 begins with the context of American defense policy. Paul Carrese's article "American Power and the Legacy of Washington: Enduring Principles for Foreign and Defense Policy" is an exceptional outline of the difficulty of writing a constitution that protects the freedoms earned through bloodshed in the War for Independence. Most of all, it highlights George Washington's professionalism as both a soldier and statesman whose devotion to the Republic challenges every American to consider the interest of the country before oneself or one's party. Additional articles in this section help develop the history of defense policy from the "just war" theory on the morality of war and how it may be applied to American defense issues facing policy makers in the next 20 years.

Part 2 focuses specifically on the process of defense policy making. In the opening chapter, Richard Kohn discusses the intent of the constitution in the separation of powers, which Louis Fisher's article points out have been degraded by increasing executive power to employ the military without the consent of Congress. This continuously requires Congress to control involvement by limiting or withholding funds to control the president's use of the military in foreign affairs. Roger Barnett's "Legal Constraints" is an excellent review of just cause and the proportionality of war, which has led to many conventions and treaties establishing the Law of Armed Conflict. The remainder of part 2 explains the role of the media in developing policy and the command and control structure for the military, including an article covering the Goldwater-Nichols Department of Defense Reorganization Act. It concludes with the allocation of resources through the Planning, Programming, and Budgeting System.

Part 3, "The Changing Instruments of American Defense Policy," initially reviews the history of change within the military from technical revolution to today's transformational defense policy. Andrew Krepinevich's article points out four elements to military revolutions and seven historical lessons learned. All of the essays emphasize that advantages are limited over time as military technology and techniques proliferate to adversaries. It moves on to examine the integration of military force with other instruments of national power to achieve national objectives. Barry Posen's article is a superb overview of the US military position in today's world, offering a realistic view of primacy versus selective engagement in supporting US foreign policy. Finally, this section looks at the development of professional policy makers through the implementation of the professional military education (PME) program. The Center for Strategic and International Studies article outlines the various stages of PME. It summarizes the requirement for ever-changing curricula within the PME program to prepare military leaders for rapidly changing technological advances, increased jointness, and complex issues involved in developing national security policy.

Part 4 discusses the outcome of defense policy across four areas: civil-military relations, conventional forces, nuclear policy and missile defense, and homeland security. Most of these areas have changed drastically as a result of the terrorist attacks of 11 September 2001 (9/11) and the proliferation of weapons of mass destruction. The essays on civil-military relations review the question of professionalism. Must military members forfeit certain constitutional rights to remain as apolitical advisers in the development of defense policy in order to maintain civilian control? What is the role of retired generals? How can we change PME to teach military professionals how to engage in the political process? These questions will be discussed for centuries to come but are more difficult to answer as military leaders face new roles of diplomacy in implementing US policy around the world. The essays on conventional forces look at the roles of air, land, sea, and space with advances in technology and changing strategies. Gen Richard B. Myers's article on "Shift to a Global Perspective" brings to light the importance of senior leaders' ability to understand the political-military situation on a worldwide scale. This view of the world and the way actions in one area affect another are key to making decisions and developing defense policy that will successfully support the national security strategy. The articles on nuclear policy continue the debate over developing the Robust Nuclear Earth Penetrator to kill deep-earth targets. The missile-defense studies cover the feasibility of this system and the concept of the capabilities-based acquisition program in regard to the ground-based, midcourse defense system.

The book concludes with a review of the 9/11 attacks and the challenges of securing the homeland. Bruce Hoffman's quick look at terrorism and detailed examination of Osama bin Laden as the chief executive officer of terrorism should make everyone realize how difficult it will be to contain this vast network. The remaining articles raise questions on how we prosecute terrorists in the United States and how we use the military in homeland security without violating the Posse Comitatus Act.

Many changes have already been implemented, such as the Department of Homeland Security and the Director of National Intelligence. But within these agencies, one finds the need to embrace the interagency concept in order to connect the dots in foiling future terrorist attacks. As one can surmise from this section, it is one thing to develop American defense policy but quite another to implement it.

As with all books based on a collection of essays, some articles stand out from the others, but each one generates questions worth researching and discussing. *American Defense Policy* is unquestionably an excellent book for anyone beginning in the field of defense policy; it gives people in the business a chance to reflect on the changes in developing defense policy today in comparison to those faced by our founding fathers.

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Stand Well Clear: More Adventures in Military Aviation by D. K. Tooker. Naval Institute Press (http://www.usni.org/press/press.html), 291 Wood Road, Annapolis, Maryland 21402-5034, 2003, 192 pages, $28.95 (hardcover).

Author D. K. Tooker, a retired Marine lieutenant colonel, served for 25 years, participated in significant combat events, and accumulated many accolades during his career, including two Distinguished Flying Crosses. He also wrote *The Second-Luckiest Pilot* (Naval Institute Press, 2000). *Stand Well Clear*, his more recent book, is a collage of 19 adventures of flyers. Using a credible, easy-to-understand writing style, Tooker focuses on both aviation and the Airmen who flew the missions. Because he actually experienced many of his stories, he writes from a unique vantage point. From nearly running out of fuel in a supersonic jet to commuting in a Cessna 150, he offers a wide array of flying experiences. Some of the tales teach lessons to up-and-coming flyers; others provide proof of the old saying "better to be lucky than good." Although the flying episodes certainly highlight the book, Tooker does occasionally "leave the air" to tell some stories about the flyers' ground exploits as well.

Likely, flyers will relate directly to his style and delivery. I enjoyed Tooker's "pilotspeak" and was pleased that he included epilogues indicating the current status of the aviators about whom he writes. Sadly, some of them died in ground or air mishaps.

The book's relevance to the Air Force community lies directly in the history of the aviation stories, especially the mishaps. Each of these could easily fill hundreds of pages, but Tooker does a nice job condensing them to a few relevant pages. Overall, *Stand Well Clear* is an easy read—just the right length for the aviation enthusiast to put in a briefcase and read on his or her next commercial flight.

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In Their Own Words: Conversations with the Astronauts and Men Who Led America's Journey into Space edited by Scott Sacknoff. SpaceBusiness.com (http://www.spacebusiness.com), P.O. Box 5752, Bethesda, Maryland 20824-5752, 2003, 224 pages, $14.95 (softcover).

Anyone with an interest in the US space program will enjoy *In Their Own Words*. A fascinating and enjoyable read that I had trouble putting down, it consists of 14 interviews, eight of which are with astronauts and the remainder with other famous figures associated with the space program. A variety of individuals conducted these interviews, which reveal many little-known anecdotes. These tidbits range from the mundane and humorous to the surprising and tragic. Although I began following the space program very closely almost 40 years ago, I was surprised by what I learned from this anthology.

The only chapters presented in chronological order include Robert Goddard's and Alan Shepard's. Although not an interview, Goddard's chapter consists of excerpts from his report of a launch in 1940 of a liquid-propelled rocket weighing 500 pounds. His writings summarize the work that further advances in spaceflight would require, including "fields of study and mathematical analysis, experimentation, invention, laboratory and shop work, ground tests, and air demonstrations" (p. 6).

The modesty of Goddard in chapter 1 contrasts sharply with the arrogance of Alan Shepard in chapter 2. Shepard refers to Pres. John F. Kennedy as "Jack" several times, indicates how he justly won the intense competition among the Mercury 7 astronauts to be selected for the first mission, and gives the reader the impression that the program "owed" him a mission to the moon. I was never a fan of Shepard, and this interview reinforced my feelings. Interestingly, the interview with Walter Cronkite also mentioned how members of the press

thought Shepard was arrogant and how they even circulated a petition to the National Aeronautics and Space Administration requesting the selection of the popular John Glenn as the first American into space.

The book picks up the pace in subsequent chapters, each interview shedding more light on the space program—especially its human side. Most of the astronauts appear hard working, grateful to have been chosen for the space program, and very smart. Pete Conrad Jr. is a case in point. A Purdue graduate with an advanced engineering degree and impeccable test-pilot credentials, he had much more personality than Neil Armstrong and added levity to his moon landing, which occurred just four months after *Apollo 11*'s. In this interview, we learn that *Apollo 11* landed four miles from its planned landing site and that the pinpoint accuracy of *Apollo 12* was truly amazing, allowing the astronauts to take samples from a surveyor spacecraft located within sight of the lunar module.

Interviews with Charles Duke, Jim Lovell, Fred Haise, Guenter Wendt, Gen Bernard Schriever (father of the intercontinental ballistic missile), Scott Grissom (Gus Grissom's oldest son), Jim McDivitt, Jack Lousma, and Walter Cronkite reveal additional fascinating points:

- The most beautiful sight from space was of Earth rising above the moon, a "typical 2001 impression . . . very stark and spectacular," according to Charles Duke (p. 52).
- Astronauts walking on the moon frequently fell because of the bulky pressure suits and the moon's low gravity (one-sixth that of Earth).
- Three of the four lunar-landing training vehicles crashed during training, one crash almost killing Neil Armstrong.
- Gus Grissom would have probably been the first man on the moon had he not died in the *Apollo 1* disaster.
- Scott Grissom, the astronaut's oldest son, believes Neil Armstrong was not a good pick for *Apollo 11* because he was "very shy, very, very reclusive" and not a good ambassador for the space program (p. 76).

The most memorable passages, especially those by Pete Conrad and Charles Duke, come from descriptions of walking on the moon. As Conrad recounts, "I don't think that anybody realizes what it means to say that the moon is one-quarter the size of the Earth until one stands on it. It is small. My first impression was, 'I can't believe this. This thing is curving away from me. I can see it going over the hill.' We were out walking around, a distance not too far away from the LM [lunar module], when we realized that we couldn't see it anymore. The LM was 23 feet tall!" (p. 42). When asked if he had explored any craters, Duke responded, "Neither John [Young] nor I ventured to the bottom of a crater such as Plum or North Ray crater. These craters were too deep for us and the walls too steep. The dangers were considerable at a crater such as North Ray which was almost two hundred feet deep. If you accidentally fell into that crater and survived the fall there was no way to extract yourself as we had no lifelines or the ability to pull one another out" (p. 61).

Although the book offers many other exceedingly interesting stories and balanced interviews covering both the support side of space and actual operations, it does suffer from a few minor flaws. The interviews are choppy at times, jumping between different topics haphazardly, and misspellings are common—probably the result of not adequately proofreading the transcriptions of the recorded interviews. But these shortfalls are minor and do not significantly detract from the book.

With 125 shuttle flights now history, there is clearly plenty of material for a sequel to *In Their Own Words*. When Orion, the planned successor to the space shuttle, begins taking astronauts back to the moon and beyond, we will have even more interviews to motivate and fascinate readers, especially young people who, like previous generations, will be eager to reach for the stars.

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Filling the Ranks: Transforming the U.S. Military Personnel System, Belfer Center for Science and International Affairs (BCSI) Studies in International Security, edited by Cindy Williams. MIT Press (http://www-mitpress.mit.edu), 55 Hayward Street, Cambridge, Massachusetts 02142-1493, 2004, 376 pages, $50.00 (hardcover), $25.00 (softcover).

Normally, one does not expect too much from an anthology made up of chapters written by various authors. Usually, the quality varies from chapter to chapter, and the resultant book often lacks cohesion around any central themes. *Filling the Ranks* is the exception that proves the rule. From cover to cover, it is well written and edited; the vari-

ous authors are first-rate experts; and the book coheres around the theme of how the United States might convert its Cold War military personnel system to one more suitable and affordable for the new century.

There is little doubt that the system needs an overhaul and even less doubt that the task is a difficult one. Motivators are different; the required talents are often quite different. The other superpower is gone. Another peer competitor is not on the horizon. US armed forces are no longer forward deployed, for the most part. Rather, they have become more expeditionary in nature. The draft is gone, and the supply of high-quality males is limited. Women are increasingly a major factor and now are a growing element in the combat forces of the Air Force and Navy. Forces are older, and more of them are married. Requirements for technologically capable people have continued to grow in a steady, upward curve. Potential adversaries include not only the states of old but also all sorts of nongovernmental organizations posing a wide variety of threats at all points of the compass. It seems that quality has become relatively more important than quantity. Yet, the Cold War personnel system goes on with its associated obligations that make it an increasingly expensive consideration—but it is supported by a host of groups reluctant to accept radical change.

The distinguished contributors to *Filling the Ranks* include Owen R. Coté Jr., Aline O. Quester, Stephen Peter Rosen, Bernard Rostker, Elizabeth A. Stanley-Mitchell, and others. Most of them are from leading research institutes, Ivy League schools, or government. Prominent among them are people from the Center for Naval Analyses.

One of the best essays, by Coté, predicts the kind of operational and technical world we will face as the century goes on. He estimates that the disappearance of the Cold World and the conventional military hegemony of the United States will increasingly lead to conflicts that avoid American strength. The conflicts will be more varied and harder to define, which in turn will require decentralization of both the operational and acquisition worlds. That means recruiting not only junior officers and enlisted personnel with a wider set of capabilities than those of the past, but also those willing and able to assume greater decision responsibilities. One implication of that requirement is the need to decrease costs through more-flexible pay systems since the United States can no longer afford to pay people in unskilled fields at the same rate required to attract and hold individuals with technological and operational skills of a higher order.

The chapter by Rosen, one of America's foremost scholars on military innovation, is most impressive. He understands that real personnel reform will require a difficult culture change. The present leadership has a lifetime investment in learning and experience that it is understandably reluctant to sacrifice for unproven virtues. One of Rosen's examples of obvious reforms difficult to change is the US individual replacement system in place since World War II. He argues that the "regimental system" has long ago achieved greater combat power by replacing losses by unit rather than by individual. Yet, we still have the traditional American system. He sees similar difficulties with the military's system of professional military education—the war colleges and command-and-staff schools, for example. He says that these are relics of the nineteenth century, when civilian colleges teaching the needed subjects were not available. Now they are. The schools also served as a means of storing officers capable of command-and-staff work during times of peace so that they would be available when mass mobilization became necessary. Such mobilizations, according to Rosen, are not likely in the future. One of the impediments of change is the difficulty of measuring combat power in the absence of major war. Simulations cannot do it because they are full of assumptions that may or may not be true. Competition between units or services can help, but it is not a perfect tool. Rosen suggests that trying new pay policies in one service might help demonstrate the potential to attract more people with technological and leadership capabilities. Another of his suggestions involves making reforms by stealth. Adm William Moffett remained in the closet for a long time by advocating airpower as a supplement, not a replacement, for battleships. In that way, he got the money he needed for carrier and aircraft development out of battleship sailors without seeming to threaten their well-being.

Those are just two examples of the many first-class essays in *Filling the Ranks*. Flexibility is a common plea among them: the system pays a private without a high school diploma the same as one with an associate's degree. Pilots, engineers, scientists, and other technical people can easily transition into lucrative civilian jobs, but there is not much of a civilian market for combat infantrymen. Yet, the system is not flexible enough to hold those with the most necessary skills. Another idea common to several chapters is that options should exist for longer careers for some officers. The days of needing strong and fast "yellowlegs" (cavalry) to chase Indians are long gone. We are much healthier now. Yet, we often must retire folks after 20 or 30 years, just

as they are reaching their prime. Since the end of the Cold War, a major change has occurred in the utilization of reserve components. The days of the weekend warrior are over; this is the day of prolonged activation and repeated deployments—a difficult situation for reservists, their families, and their employers. Unless we improve compensation, recruiting will surely suffer. In sum, *Filling the Ranks* is relatively free of the typical limitations of anthologies, and air warriors would do well to add it to their reading lists.

Dr. David R. Mets
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The Rising Tide: A Novel of the Second World War by Jeff Shaara. Ballantine Books (http://www.randomhouse.com/rhpg), 1745 Broadway, New York, New York 10019, 2006, 576 pages, $27.95 (hardcover).

Author Joseph E. Persico has said that Jeff Shaara has the ability to "make literature read like history and history read like literature." Shaara has done so again in *The Rising Tide*, his newest novel. In my opinion, Shaara is *the master* of American-military historical fiction. His ability to blend fact into fiction and breathe life into historical characters places him in a genre all his own. He first completed a trilogy on the American Civil War begun by his father, Michael, with *The Killer Angels* (1996) (the inspiration for the film *Gettysburg*). Shaara put us into the thoughts and actions of Robert E. Lee, Ulysses S. Grant, and common soldiers of the Union and Confederacy. He then wrote a book on the Mexican-American War and a two-volume set on the American Revolution that can only be called visionary in depth and scope. *To the Last Man* (2004), his epic of World War I, focused on the actions of American commanders.

With *The Rising Tide*, the first installment of a three-volume set, Shaara now turns his attention to World War II, focusing here on the campaigns in North Africa and Sicily. The second book will resemble *The Killer Angels* by concentrating entirely on one battle—in this case, the historic D-day invasion. The third volume will pick up sometime after the Normandy invasion and take us through the end of the war in Europe.

As with all of Shaara's other works, *The Rising Tide* begins with an introduction to the main players, including not only those with familiar names—Dwight Eisenhower, Mark Clark, Erwin Rommel, and George Patton—but also unknown frontline soldiers. This time the latter group includes a gunner on an American tank crew and a new breed of warrior: the paratrooper. Excelling at this point of view, Shaara places us in the thick smoke of Kasserine Pass and high in the sky as the 82nd Airborne makes the first of its combat jumps into Sicily.

This book may in fact be better than any of the author's other works. Shaara's methodical research enables his obvious flair for bringing historical characters to life. In *The Rising Tide*, however, he seems to overlook the role of airpower somewhat, mentioning Jimmy Doolittle and Carl Spaatz only in passing, for example. He does, though, introduce us to the pilot who, on more than one occasion, transported General Eisenhower around the Mediterranean in the B-17 Flying Fortress known as *The Red Gremlin*—that flyer was none other than Lt Col Paul Tibbets. In response to my question about whether he felt that he ignored the role of airpower in this book, Shaara replied,

> My approach to the World War II trilogy is to focus on a variety of characters, in a variety of roles. In every story I do, *the greatest challenge is what to include and what to leave out*. In *To The Last Man*, the contrast between the experiences of pilots and Marine grunts was very poignant to me, and made for what I thought was a very contrasting story line. I've caught grief from sailors because I seem to have ignored the Navy in every book I've done. In the Atlantic alone, there are volumes of great naval stories, from the submarine war to the Bismarck. I barely mention any of that.

Fair enough. After all, Shaara writes historical fiction for general consumption—not to satisfy the desires of a few airpower advocates.

Readers who wish to take a break from the usual fare found in *ASPJ* but who don't want to read fiction for fiction's sake should take a look at Shaara's latest effort. *The Rising Tide* brings the story of World War II to life in an unparalleled way, making it living history.

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Fiasco: The American Military Adventure in Iraq by Thomas E. Ricks. Penguin Group (http://www.penguinputnam.com), 375 Hudson Street, New York, New York 10014, 2006, 416 pages, $27.95 (hardcover).

Thomas E. Ricks—senior Pentagon correspondent for the *Washington Post*, author, and Pulitzer

prize winner—dedicates his most recent work, *Fiasco: The American Military Adventure in Iraq*, to "the war dead." This simple but powerful recognition sets the tone for the rest of the book. In *Fiasco*, Ricks has produced an extremely well researched, well written, and, at times, painfully detailed chronicle of the political posturing, military planning, and information campaigning that set the stage for America's engagement in Operation Iraqi Freedom. His comprehensive writing presents the reader with a fully developed portrayal of the lightning pace of phase one, the segue into phase two, and the onset of prolonged phase-three operations that eventually morphed into the protracted phase-four undertaking in which the nation remains engaged after the cessation of principal combat. The author also provides historical context for Iraqi Freedom by concisely summarizing the political and military environment as it transitioned from the first Gulf War in 1991 to deliberations preceding the national-security decisions in 2002 and 2003 to displace Saddam Hussein's regime. He offers in-depth, though at times pointedly opinionated, explanations regarding the reasons and arguments for the national-security shift away from a policy of containment toward a policy of preemption as the precursor to the US decision to displace Hussein. His efforts are instructive and thought provoking.

The book's title and the opening salvos hurled in the first several pages leave no doubt that Ricks views the American-led invasion of Iraq as reckless and devoid of sufficient military planning and strategic forethought regarding an extended occupation of the country. He explains that "this book's subtitle terms the U.S. effort in Iraq an adventure in the critical sense of adventurism—that is, with the view that the U.S.-led invasion was launched recklessly, with a flawed plan for war and a worse approach to occupation" (p. 3).

No one is spared Ricks's biting comments that indict our most senior civilian political, diplomatic, defense, and intelligence leaders as well as some major uniformed players, blaming them for the current situation in Iraq. He is quick to point out what he perceives as personality flaws, professional egotism, and decision-making ineptness among the senior leadership involved in deliberations to invade; indeed, some readers may find the criticisms characteristic of an exposé. However, no student of social, political, diplomatic, and military history should allow the book's title or its early passages to deter him or her from making this work a must-read.

The author's research on broad strategic issues and his often excruciatingly meticulous accounts of tactical planning and events are impressive. His heuristic, consistent use of anecdotal material to explain broader planning and engagement discussions and implementation not only validates his points, but also provides context rarely seen in mass-appeal publications.

Ricks's fine definition of people and events is indicative of his enormous access to the people involved and to details of the deliberative-planning documents. His arguments regarding the evolution of the insurgency that now persists in Iraq are intriguing and essential to a critical evaluation of our engagement there.

The author has designed *Fiasco* to spur public debate regarding use of the military instrument to achieve national-security objectives. For the most part, he directs his frequent criticisms toward America's most senior leaders. His treatment of the soldiers, sailors, airmen, and marines responsible for conducting the mission in Iraq is both compassionate and patriotic. Throughout, Ricks heralds the bravery, sacrifice, and commitment they exhibit in performing the war-fighting, security-enhancing, and nation-building tasks that form the foundation of our stated intent in that country. He credits senior leadership where appropriate yet freely and frequently takes to task those people, decisions, and events he deems counterproductive to the publicly communicated mission there.

Exceptional in its depth and breadth of reporting, *Fiasco* displays a panoramic view of all the major political and military actions that contributed to Iraqi Freedom. Readers would do well to invest time in fully appreciating its war-reporting value and importance.

Col Robert A. Potter, USAF, Retired
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Mission Debrief

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The Editor

OUR CONTRIBUTORS

Gen Bruce Carlson (BA, University of Minnesota–Duluth; MA, Webster University; MA, Naval War College) serves as commander, Air Force Materiel Command, Wright-Patterson AFB, Ohio. His staff assignments have included positions at Tactical Air Command, Headquarters US Air Force, the Office of the Secretary of the Air Force, the Office of the Secretary of Defense, and the Joint Staff (as director of force structure, resources, and assessment). Additionally, he commanded the Air Force's stealth fighter wing, the 49th, at Holloman AFB, New Mexico. Prior to assuming his current position, he served as commander, Eighth Air Force, Barksdale AFB, Louisiana, and as joint functional component commander, Space and Global Strike, US Strategic Command, Offutt AFB, Nebraska. A command pilot with more than 3,000 flying hours and combat experience in the OV-10, General Carlson has flown multiple aircraft weapon systems.

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.

Maj Stephen Chambal (USAFA; MS, PhD, Arizona State University) serves as deputy chief, Commander's Action Group, Air Force Materiel Command (AFMC), Wright-Patterson AFB, Ohio. He spent four years on the Air Force Institute of Technology (AFIT) faculty, with follow-on assignments to the National Reconnaissance Office, Air Command and Staff College, Air Force Research Laboratory, and now on the AFMC staff. Additionally, he continues to serve as an adjunct associate professor at AFIT, part-time faculty member at the University of Dayton, and guest lecturer at Wright State University.

Maj Geoffrey F. Weiss (BS in Aerospace Engineering, University of Virginia; MAS [Master of Aeronautical Science], Embry-Riddle Aeronautical University; MMS [Master of Military Studies], Marine Corps University) is a student at the School of Advanced Warfighting, Quantico, Virginia. He previously served as an executive assistant to the assistant vice-chief of staff and as an influence-operations program manager on the Air Staff in the Pentagon. Major Weiss has also held a number of group and squadron assignments, including senior director at the Southeast Air Defense Sector, Tyndall AFB, Florida; chief, Standardization and Evaluations, 932nd Air Control Squadron, 85th Group, Keflavik, Iceland; and chief, Current Operations, and flight commander, 966th Airborne Air Control Squadron, 552nd Air Control Wing, Tinker AFB, Oklahoma. In addition, he was the wing's chief surveillance evaluator for two years. A graduate of Squadron Officer School, Air Command and Staff College, and Marine Corps Command and Staff College, Major Weiss is a senior air-battle manager with over 1,800 hours in the E-3 Sentry (AWACS) and 140 combat-support hours in Southwest Asia.

Capt Jeffrey G. Cunningham (USAFA; MS, Naval Postgraduate School) is an operational ensemble modeler at Headquarters Air Force Weather Agency, Offutt AFB, Nebraska. His primary duties include ensemble-forecast system development and war-fighter applications. At the Naval Postgraduate School, he specialized in numerical weather prediction. He has also served at Shaw AFB, South Carolina, as a lead forecaster for Department of Defense facilities across the southeastern United States. Captain Cunningham is a graduate of Squadron Officer School.

Col Phillip S. Meilinger, USAF, retired (USAFA; MA, University of Colorado; PhD, University of Michigan), has 30 years of service as a command pilot, staff officer, and educator. He flew C-130 and HC-130s in both Europe and the Pacific, while also working in the Pacific Airlift Control Center. During Operation Desert Storm in 1991, he worked in the Plans Directorate on the Air Staff in the Pentagon. He has taught at the Air Force Academy as well as the Naval War College and served as dean of the School of Advanced Airpower Studies (now the School of Advanced Air and Space Studies) at Maxwell AFB, Alabama. He is the author of five books and over 75 articles on military theory and operations. Upon retiring from the Air Force in 2000, Colonel Meilinger worked as a defense contractor in the Washington, DC, area. He retired again in 2006 and now lives in the Chicago area, where he is a freelance writer.

Maj Bryan D. Watson (BA, JD, University of Missouri–Columbia) is a military judge, stationed at Randolph AFB, Texas. He presides over courts-martial, military tribunals, administrative boards, judicial investigations, and special hearings. In previous assignments, he has worked in the area of criminal law as both a prosecutor and defense counsel, including service as a special assistant US attorney. He has represented the United States in various matters, including tort claims, procurement contracts, and labor/employment law, and has worked in the areas of international/operations law. Previous assignments include Moody AFB, Georgia; F. E. Warren AFB, Wyoming; Langley AFB, Virginia; and Maxwell AFB, Alabama. He is licensed to practice before the Supreme Court of Missouri, the United States Court of Appeals for the Armed Forces, and the Air Force Court of Criminal Appeals. Major Watson is a graduate of Squadron Officer School and a distinguished graduate of Air Command and Staff College.

Maj F. Anthony Eckel (BS, State University of New York–Cortland; MS, Air Force Institute of Technology; PhD, University of Washington) is an instructor in the Meteorology Department at the Naval Postgraduate School, Monterey, California. He previously served as chief of the Meteorological Models Branch at Headquarters Air Force Weather Agency, Offutt AFB, Nebraska, where he pioneered the development of an ensemble-forecast system. He also served in several operational weather-support positions, including a three-year tour at Yokota AB, Japan, as chief of weather operations. Recipient of the Air Force Institute of Technology's Commandant's Award for the most outstanding thesis, he has published articles in professional, atmospheric-science journals and has authored Air Force training and education materials. Major Eckel is a graduate of Squadron Officer School, Air Command and Staff College, and the Air Force Institute of Technology (intermediate developmental education).

Dr. David R. Mets (USNA; MA, Columbia University; PhD, University of Denver) is professor emeritus at Air University's School of Advanced Air and Space Studies and military defense analyst at the Air Force Doctrine Development and Education Center. He studied naval history at the US Naval Academy and taught the history of airpower at both the Air Force Academy and West Point. During his 30-year career in the Navy and Air Force, he served as a tanker pilot, an instructor navigator in strategic airlift, and a commander of an AC-130 squadron in Southeast Asia. On another tour there, he was an aircraft commander for more than 900 tactical-airlift sorties. A former editor of *Air University Review*, Dr. Mets is the author of *Master of Airpower: General Carl A. Spaatz* (Presidio, 1988) and four other books.

Col Scot T. Heckman (BS, Lyndon State College; MS, Colorado State University; MA, Naval War College; MSS [Master of Strategic Studies], Air War College) is the military assistant for environmental monitoring to the Office of the Assistant Secretary of Defense for Networks and Information Integration, Pentagon, Washington, DC. He has previously served on the staff of Air Force Space Command and Headquarters US Air Force. During Operation Iraqi Freedom, he commanded the 36th Operations Support Squadron and the 7th Expeditionary Operations Support Squadron at Andersen Air Base, Guam, supporting Pacific Command's deterrent operations. A master meteorologist, he was director of operations during the stand-up of the 20th Operational Weather Squadron at Yokota Air Base, Japan, and led the Range Weather Flight at Cape Canaveral Air Station, supporting military, commercial, and NASA space launches. Colonel Heckman received his commission in 1986 through the Air Force Reserve Officer Training Corps at Lyndon State College, Vermont.

Maj Dale E. Hetke (USAFA; ML [Master of Logistics], Air Force Institute of Technology) is a staff officer at Headquarters Air Combat Command, Langley AFB, Virginia. He has served three operational tours as an F-16 pilot at Osan Air Base, Republic of Korea; Aviano Air Base, Italy; and Mountain Home AFB, Idaho. He has received four Aerial Achievement Medals for flying in combat zones such as Iraq and Kosovo. At the Air Force Institute of Technology, he earned the Distinguished Graduate Award. Major Hetke is a graduate of Squadron Officer School, Air Command and Staff College, and the Air Force Institute of Technology (intermediate developmental education).

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