



AIRPOWER

Spring 1995

JOURNAL

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EDITORIAL

There Are No Sacred Cows

WITH CHANGES in the air, you can almost hear the herd of sacred cows boarding the train, destined no doubt for the same crypt that holds both the lost Ark of the Covenant and the "regular" crew chief. We see change everywhere (even the "new" Air Force uniform is now old)—in Congress, in the senior leadership of the Air Force, and in the focus and format of the *Airpower Journal*. Changes outlined by my predecessors at *APJ* in previous editions leave us all with new challenges. I'm thrilled to take these challenges up with you.

In these last few months, the public has been forming opinions of the new Republican majority that was swept into office in the November elections. And it seems that just about everyone except Judge Lance Ito has had an opinion on the "new" uniform. Of course, he was never asked. But our metrics suggest that you have yet to form an opinion on the substantive *APJ* format changes discussed in recent editorials. I can remember great ululations over the demise of *Air University Review* and the shift in *APJ*'s focus away from strategy and policy issues. Now that they're back, we're alarmed that your silence is deafening. I can certainly understand why.

When I was a captain, I thought I could run the Air Force and often wrote about that. My superiors were patient and attentive to my grand strategic lucubrations, knowing well they would never jeopardize a budget line. My professional writing adolescence occurred during the Reagan years when there was nothing sacred about cows. There were cows enough for everyone. In this era of fiscal retrenchment and the attendant anxiety

that downsizing brings, I'm sure you've been investing more brain cells in your promotion portfolio—doing your job to the best of your ability—than in contributing to the professional discourse this journal represents. These days, the challenge of putting food on the table is much more urgent.

I'd suggest to you, though, that with these focus and format changes, there has never been a better time to diversify your promotion portfolio by becoming an active participant on these pages. These days, everyone's budget line is in jeopardy already and the train carrying the sacred cows has since crested the horizon. Some of the ideas forwarded in *APJ* will scream for your critique. You don't have to write a thesis to respond—and actively participate in the professional dialogue. In today's Quality Air Force, your supervisors have everything to gain if your name appears as a contributor. If you're intimidated by your supervisors, let me know. Don't sit on a paper you're waiting to incorporate into some larger effort. Send it in and we'll work with you and process your papers quickly in our attempt to keep topics current.

As editor of the Air Force's only professional journal, I help shape the professional dialogue of the Air Force officer corps. Your active participation in this forum doesn't make my job any harder or easier. It simply gets the job done.

So, I'm thrilled about the changes in the *APJ* focus. Tell us what you think about them. More important, seize the opportunities afforded by the new format. The Air Force is hungry for your ideas. Let us hear from you soon. JWS

NEXT TIME: In Defense of a Little Readability

We encourage your comments via letters to the editor or comment cards. All correspondence should be addressed to the Editor, Airpower Journal, 401 Chennault Circle, Maxwell AFB AL 36112-6428. You can also send your comments by E-mail to Spencer=James%ARJ%CADRE@Chicago.AFWC.AF.MIL. We reserve the right to edit the material for overall length.

VALUING LEADERSHIP

Capt Charles T. Barco's article, "Valuing Leadership in an Era of Prophets, Politicians, and Pugilists" (Fall 1994), was a timely look at military leadership in a quality culture, but (1) only hinted at the important questions our leaders and management think tanks must address and (2) made implied assumptions about the answers to those questions: Does the quality management philosophy erode our ability to nurture (and promote) leaders capable of leading in war? Does our commitment to military leadership undermine our ability to foster quality in our business practices? Do we want coup d'oeil functioning (and, if so, to what degree) within the structured approach to problem solving (or is it more applicable to seat-of-the-pants management)?

In addressing these and other important questions, we should remember, as stated in the article and taught in most basic quality courses, that team problem solving is ideal for specific, complex, (usually) cross-functional problems that need a range of detailed expertise or a broad organizational "buy-in" to solve. In implementing quality, we should not discard "bureaucratic" notions like hiring facilitators, using charters, managing by facts/data/analysis, etc. We must realize that these notions make our teams more effective.

Experience as a process action team (PAT) leader should not be viewed as a means of training combat leaders. The responsibility of the team leader is to get the best result when he or she has neither all the required expertise nor command authority over the team. Combat lead-

ership seems more a matter of operational expertise supplemented by a practiced familiarity with other areas (especially logistics). This sort of expertise is more likely to be found in our combat leaders as a result of their training and experience. All that remains, then, is to nurture (in the appropriate arena) those other qualities of leadership that will best prepare our combat leaders to apply their intellect, intuition, training, and experience in war.

Capt Timothy M. Torres, USAF
Scott AFB, Illinois

The Author Responds

Captain Torres raises a variety of thought-provoking questions that ultimately revolve around how we define quality and then employ it. I have always considered quality a value that fits beautifully into our lifetime pursuit of coup d'oeil. But such understanding is dependent on an appreciation of quality as a "system of profound knowledge"—not as disjointed fads or bureaucratic notions. Ideally, quality establishes a pattern of leadership and systems thinking which if properly nurtured can be employed at every level of our organization in every type of environment.

Our ultimate goal of human resource development in the Quality Air Force should be to develop coup d'oeil. As such, coup d'oeil is not seat-of-the-pants management, but the emerging inner eye that leads you to effectively and efficiently read situations/people and then act accordingly. Thus, based on our operating style, coup d'oeil is the absolute art of quality-based problem solving whether it be in war or peace.

Fortunately, the increasing thinking skills associated with coup d'oeil can be nurtured. Unfortunately, I fear that in an effort to implement quality we may be stifling the very intuitive skills we are attempting to develop.

Maj Charles T. Barco, USAF
Maxwell AFB, Alabama

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THE STATE OF THE AIR FORCE*

DR SHEILA E. WIDNALL
SECRETARY OF THE AIR FORCE



THE UNITED STATES Air Force remains the premier air and space force in the world and a critical contributor to our national security. Our mission is "to defend the United States through control and exploitation of air and space." Our guiding construct, Global Reach—Global Power, defines five roles in support of this mission: sustaining nuclear deterrence, providing versatile combat forces, supplying rapid global mobility, controlling the high ground of space, and building US influence around the world. These roles have assumed heightened significance in the post-cold-war era. Air and space power provide an economical means for shaping the international environment through global presence and increasingly underpin national capabilities to conduct decisive combat operations worldwide on short notice.

Since our birth in 1947, the Air Force has been an institution that thrives on change, but never so successfully as during the past several years. We have cut personnel by one-third, fighter forces by nearly half, and the

bomber force by two-thirds. Our budget is down 40 percent from its cold war high. During this period, the Air Force recreated itself. First came the Year of Organizing. We restructured top to bottom—consolidating major commands and redefining authority so people charged with new missions control the resources to do the job. Next came the Year of Training. We are now implementing life-cycle training processes in support of all USAF requirements. The Year of Equipping followed. We reinvigorated planning—developing road maps across 40 mission areas to make educated decisions that balance current readiness with modernization needs. Finally, this past year was the Year of Readiness. We strengthened readiness forecasting and are poised to win future battles through better resource management today. Thus, in a very real sense, this year will be a year of dividends. The forward-leaning initiatives of the past four years are yielding big returns. Today's Air Force is simpler, more flexible, tougher, less expensive to operate, and focused on the tasks ahead.

Yet, while resources have diminished, demands for air and space power are increasing.

*This article is an excerpt from the "Report of the Secretary of the Air Force, 1994," in the *Report of the Secretary of Defense to the President and the Congress* (Washington, D.C.: Government Printing Office, February 1995).

This trend suggests bigger challenges in the next decade than those we overcame in the past. In a world defined by contingencies, we have set our sights on four objectives to help guide us in these turbulent times: remaining engaged, supporting our people, preserving combat readiness, and building for the future. This report recounts our accomplishments in these areas and identifies key challenges.

Engagement

The new world environment required a new national security strategy aimed at providing stability for the emergence of new democracies. The Air Force is fully engaged in support of that strategy. While personnel strength has fallen one-third across the force and 50 percent overseas, the number of people on temporary duty overseas is up nearly fourfold since the Berlin Wall fell. Our global reach forces operated in nearly every country in the world this year. We delivered 75,000 tons of relief to Bosnia and 15,000 tons to Rwanda and Zaire. Our airlift and tanker forces continue to support contingency operations in Europe, Southwest Asia, and the Caribbean, as well as to conduct humanitarian missions in these and other areas around the globe.

Our combat components are also charting new territory. Almost 50 percent of our active duty fighter force is continuously engaged overseas. These forces support alliances, promote stability, and provide sustained combat power on demand throughout Europe, Asia, and the Middle East. We have flown 18,000 sorties over Bosnia. In February 1994, our F-16s downed four jets attacking targets in a prohibited zone. In the Persian Gulf, we have flown more than three times as many missions since Desert Storm as we did during the war itself. Within 10 days of Iraq's provocation last fall, 122 combat aircraft had augmented the 67 already deployed, and we had flown 1,000 sorties in support of Vigilant Warrior. To drive the point further, four bombers on a power-projection mission

punctuated American resolve by flying non-stop from the United States to deliver 55,000 pounds of bombs within audible range of Iraqi forces. As Secretary of Defense William Perry said, "The Air Force has really deterred a war. When we deployed F-15s, F-16s, and A-10s in large numbers, I think they got the message very quickly."

Another increasingly important vehicle for Air Force engagement involves expansion of our military-to-military contacts. Since 1993, our security assistance personnel have worked in 101 countries to foster stability, sustain hope, and provide relief. Air Force training reached 4,900 international students in 1994. In fact, 29 graduates of our schools are now their nations' air force chiefs of staff. Contacts with states of the former Soviet Union and Eastern Europe are also thriving. We have exercised with Russian, Polish, and Lithuanian militaries. We have sponsored CINC (commander in chief) counterpart visits and base and unit exchanges. Thirteen US states have partnerships with new nations as a result of our Air National Guard's Building Bridges to America program. Finally, our liaison teams in 12 host states provide expertise on everything from civil-military relations to chaplaincies. Through these contacts, we share American military skills, insights, and values so that foreign militaries can better help themselves and so we can operate better with them.

Finally, in response to the burgeoning requirements of engagement, the Air Force has reconceptualized presence—what it is, why we do it, and how best to support joint requirements. Our concept of presence includes all peacetime applications of military capability that promote US influence. Correspondingly, the way we exert presence is changing. We are augmenting a reduced permanent presence overseas with information-gathering systems linked to joint military capabilities that can be brought to bear either proactively or just in time.

Our space and airborne collection platforms help provide global situational awareness. Sometimes this information, by itself,

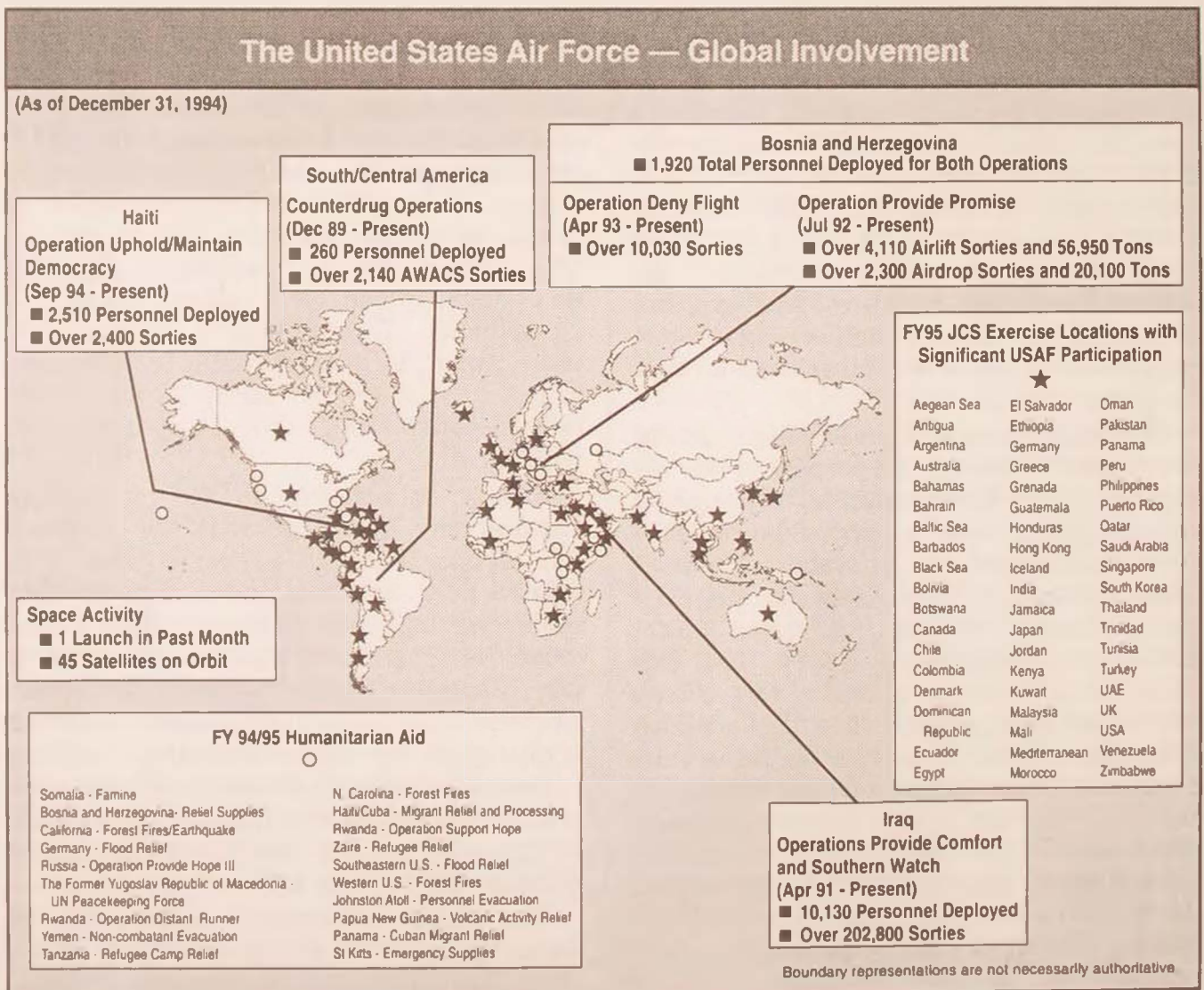
can promote US influence. In other cases, information linked to forces that can react swiftly with the right mix of joint capabilities anywhere on the globe reduces the need for traditional physical presence. Permanent presence is still imperative in many areas. And even where it is not, we routinely verify our global commitments through deployments. But we do not need and cannot afford to be everywhere at once. We can exercise more influence in more places by providing assistance, assurance, or deterrence either periodically or on demand. This allows for maximum effective use of our air and space forces to help build US influence jointly and globally, while controlling risks and minimizing costs.

Supporting Our People

People are the ultimate guarantors of combat readiness. Attracting and retaining quality people depends on providing a reasonable quality of life. This means three things: providing acceptable standards of living, treating people with dignity and respect, and managing stresses associated with high deployment tempos.

Acceptable Standards of Living

The Air Force boosted quality-of-life funding 5 percent this year. We are focusing on key areas such as child care, housing, and family support. We provide quality child care for



45,000 families each day at substantially less cost to our personnel than commercial caregivers. We are arresting growth of deferred maintenance for housing; exploring privatization to improve access to quality units; and working towards private rooms for unaccompanied enlisted personnel. Family support activities such as parenting, chaplaincy, and abuse prevention programs are reaching more people. Finally, in response to an increasing number of families citing financial strains, we have doubled financial training for new recruits.

We have accomplished much, but much remains to be done. The president's recent commitment to the highest-level military pay raise permitted by law will help stop the fall in military pay as compared to that of the private sector, but the gaps generated in past years will continue to grow (albeit at a much slower rate). Therefore, we must continue to look for opportunities to improve the lot of those who serve in today's Air Force and their families. The department's renewed commitment to a better quality of life, through investments totaling \$2.7 billion, is an important step in our efforts to counterbalance that pay gap and to achieve needed retention levels. At the same time, we will continue to pursue ways to reduce the substantial out-of-pocket housing and moving expenses that now are absorbed by military families.

Recruiting also remains a top priority. In recent years American youth have been turning away from military service. The propensity to enlist is down 35 percent since 1990, and some speculate that young people doubt our ability to provide career opportunities that are challenging yet stable. The recently enacted boosts to our advertising appropriation should help correct that misperception, but some concerns remain. We aggressively monitor recruiting trends, and stand ready to pursue the resources necessary to achieve excellence in this area so vital to long-term readiness.

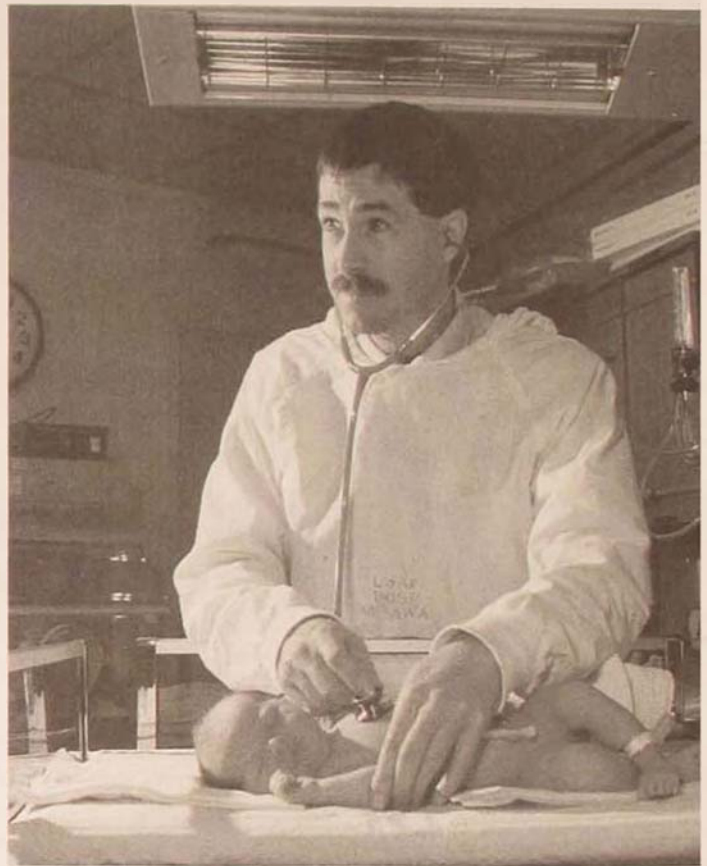
In sum, 1994 signaled a year of rededication to members of the Air Force and their families—a dedication to more equitable pay, to providing a better quality of life, and to excellence in recruiting and retention. We will continue to build on these accomplishments in the year ahead and recognize our responsibility to move quickly in arresting any adverse trends that might emerge.

Treatment of People

The Air Force is setting new standards in the equitable treatment of people to enhance unit effectiveness and cohesion. Our focus is in two areas: eliminating discrimination and harassment and enhancing professional opportunities. Air Force leaders at all levels are getting the word out—discrimination and harassment have no place in our profession and will not be tolerated. Our policy is clear, educational processes are continuously being improved, and local commanders are empowered to deal with incidents in a frank, open, and proactive way. Correspondingly, opportunities for professional growth have been clarified and expanded. Year of Training initiatives resulted in life-cycle education and training objectives that reduce uncertainties concerning requirements for advancement. New opportunities are also available to women, who now compete for over 99 percent of all positions.

Managing the Stress of Deployments

Finally, we are working to reduce the stresses associated with high deployment tempos. Personnel deployment tempos are up four-fold in as many years. Average annual deployment rates for special mission and support aircraft are particularly high—HC-130 (194 days), EC-130E (187 days), E-3 (165 days), U-2 (148 days), AC-130 (146 days), MH-60G (145 days), RC-135 (143 days), F-4G (135 days), and C-130 (126 days)—with corresponding demands on support personnel. To reduce stress on our people, we are



A strong American defense comes not from the building of gadgets but from the building of character. Every day, Air Force people are rewriting the script that reads "duty, honor, country." Over 800,000 airmen, uniformed and civilian, guard, active, and reserve, serving at 191 installations spanning the globe, have committed their lives in our nation's service.



broadening support bases for affected platforms, targeting family support for affected units, distributing deployment burdens through our Palace Tenure program, and working with our Air National Guard and Air Force Reserve partners to balance mission loads across the Total Force.

Preserving Combat Readiness

We are preserving the combat readiness of the Air Force through resource management, realistic combat training, and stability in funding to meet the challenges of contingency operations.

Resource Management

Year of Readiness initiatives produced three critical enhancements to Air Force readiness. First, we strengthened readiness forecasting. Our improved status of resources and training system (SORTS) ensures that all units provide readiness snapshots not only of current health, but forecasts looking three, six, and 12 months ahead. This system helps predict the impact of resource decisions as well as to uncover weaknesses before readiness erodes.

Second, the way we support weapon systems is being fundamentally altered. Lean logistics is an integrated effort among maintenance, supply, and transportation systems to provide the right part, at the right time, at the best price to the user. Lean logistics selectively removes one whole tier of maintenance support for highly reliable weapon systems, reduces depot maintenance time, and uses transportation procedures like those of commercial package carriers. The results are impressive. In the avionics area, for instance, repair pipeline times have been cut by 75 percent.

Third, we are enhancing readiness through better distribution of mission tasks across the force. The Air Force is making increasing use of the world-class capabilities of our Air National Guard and Air Force Reserve. These

affordable, accessible, and highly capable partners are integral to our war-fighting strategy. They are also making decisive contributions in peacetime contingency operations around the world. We have expanded their mobility roles, introduced bombers, and are funding key upgrades that reflect our increasing dependence on these citizen-airmen in frontline roles. In a similar vein, the Civil Reserve Air Fleet has been expanded to provide 34 percent of our cargo and 90 percent of our passenger capability. Finally, we are obtaining authority to use US air forces assigned to the North Atlantic Treaty Organization (NATO) on a temporary basis outside the region when required.

Combat Training

Realistic combat training is not a luxury, but a necessity. We have insisted on strong funding profiles for all combat training programs. What began 20 years ago as a modest exercise concept known as Red Flag has since become the backbone of USAF readiness. As one commander put it, "What we did in Desert Storm would have been impossible if the entire Air Force didn't have flag exercise experience." Now all Air Force flag exercises are joint or combined. Similarly, the Air Force is a full partner in all major Army exercises at the National Training and Joint Readiness Training centers. Finally, we bring our high training standards to over 50 major joint and combined exercises around the globe each year.

Underpinning this, of course, is the realistic day-to-day training that prepares our people for these large exercises. Thus, we maintain high day-to-day training tempos across the force, and daily operations increasingly emphasize composite and joint force operations to build on basic formation skills. Finally, we continue to enhance combat training through simulation, but primarily as a supplement to flight operations. Teamwork and uncompromising standards measured in a realistic flight environment are the

touchstones of war-fighting excellence. We will continue to arm our people with experiences that mimic the crucible of war in its most demanding phases.

Challenges

Stability in our operation and maintenance (O&M) budget is key to maintaining Air Force readiness, and that stability depends on timely funding for contingency operations. If future funding is delayed, then the balance between force structure and readiness support could easily be upset. We would then have less ability to deal with spot-readiness setbacks in systems such as the airborne warning and control system (AWACS), F-117s, EF-111s, B-1Bs, C-5s, C-141s, AC-130s, and in engines for the F-15 and F-16. These problems are manageable, but there is little margin for error. A related concern is the impact of contingency operations on combat training. Heavily tasked units have fewer opportunities to hone their complete repertoire of combat skills. We need continued stability in our O&M accounts, including timely funding for contingencies, in order to manage these problems.

Building for the Future

As Gen John Shalikashvili said, "The combination of slower modernization rates and a rapidly changing threat environment makes long-range planning more difficult and more important." The Air Force has set standards in this area of planning.

Planning Savvy

We have developed 25-year road maps across 40 mission areas to make educated decisions about modernization needs. These plans link future tasks to deficiencies, to candidate solutions, and to laboratory programs for an end-to-end view of each mission area. We evaluate alternatives

ranging from nonmaterial options to changes in force structure, systems modifications, science and technology applications, and new acquisitions. Correspondingly, we continue to evolve and reform the manner in which we conduct the acquisition of systems and capabilities. Through numerous initiatives we are streamlining the process, reducing the paperwork, adopting commercial practices, standards, and processes, all aimed at more effectively and efficiently placing the required capabilities into war fighters' hands.

This new planning process and our initiatives in acquisition reform are major milestones, but they are also just the beginning of a renaissance in Air Force planning and systems acquisition. The year 1995 is the 50th anniversary of the Air Force Scientific Advisory Board (SAB), whose first reports set the trajectory for Air Force modernization for decades. This year will see a similar level of effort by the SAB, Air Force planners, Air University, and our acquisition and modeling and simulation activities. I have challenged our best and brightest to revolutionize and institutionalize new planning and acquisition processes that will prepare us for the twenty-first century.

Essential Foundations

Air Force scientific and technological prowess remains the fulcrum for future readiness, but our strategies to maintain preeminence are changing. In prior decades, we produced the most critical technologies. Now we must harness commercial applications in many areas. Hence, in addition to funding our science and technology program at the maximum authorized level, we have revitalized the SAB as a nexus linking the Air Force to other government agencies, commercial sectors, academe, and our allies. Through the Air Force Office of Scientific Research, we support about 3,000 senior researchers and 2,000 graduate students at universities, in industry, and in laboratories. We have also

developed international data exchanges, research agreements, engineer/scientist exchanges, and Foreign Comparative Test and Nunn Amendment programs, and we are committed to the research activities of the NATO. These efforts keep us at the cutting edge of technological advancements and promote affordable solutions to aerospace problems. Finally, our approach to research, development, test, and evaluation (RDT&E) is also changing. Vigorous growth in modeling and simulation capabilities is promoting better RDT&E at reduced cost.

Regional War-fighting Requirements

Modernization objectives to meet two major regional conflict (MRC) requirements must be understood in their strategic context. Decisions made today have 30-year implications. Regional threats may change radically. We probably will not have the luxury of a Desert Shield-type buildup. Next time, we may be fighting our way in, racing for control of footholds in one (or two) theater(s). If we lose the race, the result will be a *fait accompli* or a long, costly war.

With these points in mind, Bottom-up Review (BUR) conclusions depended on key modernization efforts to field highly leveraged forces early on. These forces would (1) secure a lodgment in-theater, (2) blunt enemy progress, and (3) thereby lay abutments for a sea and air bridge over which follow-on forces would propagate initial success. Moreover, portions of the lead cadre must be prepared to swing to help reproduce decisive results in a second theater or to deter a second aggressor. In sum, BUR conclusions depend on leveraging the capabilities of airpower, at sufficient operations tempos and with the right munitions, to defeat two enemies on opposite sides of the globe in less than two months. Within this context, we are focusing on the following priorities.

Rapid Global Mobility

The C-141 is tired! It will continue to serve through this decade, but it makes better economic sense to modernize with C-17s rather than extend the life of this aging workhorse. The once-troubled C-17 is now a success story—replacing the C-141 at lower operating costs while delivering C-5-type payloads into C-130-size airfields. This core airlifter underpins the nation's two-MRC strategy and is US Transportation Command's highest priority. Production of the C-17 is ahead of schedule, and the aircraft made its operational debut in Vigilant Warrior. We are also evaluating augmentation using a nondevelopmental airlift aircraft with a decision pending in 1995. We are also upgrading our air refueling and theater airlift fleets to increase flexibility, better support our sister services, and enhance viability in the next century.

Air Superiority

The initial battle for air superiority may well determine the course of the next MRC. Our early deploying fighter forces may arrive outnumbered to engage the full weight of the enemy's air forces, missile forces, and surface-to-air defenses—all supported by robust command and logistical infrastructures. This is why the F-22 is our top modernization objective. Modern air battles tend to be cataclysmic. An initial disadvantage can quickly cascade into outright defeat with profound consequences for the progress of a war. Air superiority provides freedom of maneuver so ground, air, and naval forces can operate with impunity to end conflicts quickly and decisively. It is fundamental to the safe arrival and resupply of forces. It is essential for protection of high-value aircraft that help achieve information dominance, such as the joint surveillance and target attack radar system (JSTARS) and the airborne

warning and control system. And it must extend deep into enemy territory to ensure success of all other offensive operations.

The Air Force has ensured that American fighting forces have had air superiority since Kasserine Pass in the spring of 1943. We must continue this record in the twenty-first century. Many foreign fighters are now at parity with the F-15. The F-15 is vulnerable to surface-to-air missiles (SAM), and it may not win the air battle beyond the next decade. The F-22's stealth characteristics, supersonic cruise, high maneuverability, and advanced avionics all provide the qualitative edge required to fight outnumbered against future opponents and win. The ability to penetrate at the time and place of our choosing and to achieve first look/first shot/first kill decisions underwrites the capabilities of all follow-on forces in an MRC. Finally, the F-22 will penetrate enemy defenses unassisted in a strike role once the contest for air superiority is decided.

A second essential component of air superiority is suppression of enemy air defenses (SEAD), which protects aviation forces that do not possess stealthy characteristics. By upgrading a portion of our F-16s with high-speed antiradiation missile (HARM) targeting systems, we will more than offset the retirement of the aging F-4G Wild Weasel. Finally, proliferation of missiles and weapons of mass destruction (WMD) presents the most serious long-term threat to aerospace superiority. Our modernization objectives aim at neutralizing these weapons before launch and very early in flight. This will reduce stress on mid-course and end-game systems provided by our sister services. Moreover, by neutralizing WMD on enemy territory, we can create powerful incentives not to use it in the first place, better protect our forces if it is used, and thus shift our emphasis from deterrence by threat of punishment to deterrence by defense.

Surface Attack

The third vital requirement in an MRC is denying enemy power projection on land—and again, early successes reduce the costs of all subsequent operations. Our modernization objectives are centered in three areas. First, we must deliver massive firepower beginning in the opening hours of a war through a balanced approach to bomber modernization. The B-2's stealth and large payload will significantly improve flexibility and offensive striking power. Six B-2s, for example, are more lethal and survivable than all land- and sea-based airpower used during the 1986 Libya raid. While the B-2 is the head of the fleet, the B-1B is the backbone with its greater numbers, larger payload, and higher speed. The B-1B recently demonstrated its capability to sustain wartime operating rates in an operational readiness assessment, greatly surpassing the required mission-capable rate. Finally, the venerable B-52H will continue to provide an economical means to conduct standoff precision attacks or direct attacks. Acting in concert, the bomber force will provide critical leverage in an MRC and a responsive swing capability to deter or respond to a second conflict. By downsizing the bomber force to an acceptable level in the near term, we have generated savings to help fund upgrades that will enable us to deploy 100 bombers with enhanced capabilities by the end of the decade.

Second, we are modernizing theater strike and multirole platforms. The principal strength of these forces is their ability to sustain high combat tempos over long periods to maximize fire and steel on target. We are upgrading subsystems to extend life and enhance capabilities, but no new acquisitions are planned for a decade. Soon after, we must transition joint advanced strike technology (JAST) programs to make the next generation strike aircraft a reality. The ultimate success of JAST is closely tied to the F-22. F-22 production will provide technological leverage to help ensure JAST technologies are transi-

tioned in a timely and affordable way. Conversely, F-22 delays would create a fiscal bow wave in the next century as the nation attempts to field new fighter and strike aircraft simultaneously.

Third, the Air Force has made a precision commitment. In 1944, it took 108 B-17s dropping 648 bombs to destroy a target. In Vietnam, similar targets required 176 bombs. Now, a single precision guided munition (PGM) can do the job. This is how the F-117 destroyed 40 percent of all strategic targets while flying only 2 percent of all strategic sorties during Desert Storm. Consequently, the Air Force has tripled the number of precision-capable platforms since the war, boosted PGM inventories 25 percent above prewar levels, and is developing new generations of PGMs with enhanced accuracy, standoff, and adverse weather capabilities.

Dominating the Information Environment

Global reach and global power are synonymous with Air Force operations worldwide, but the 1990s have seen the ascendance of another Air Force role—dominating the information environment—by providing global situational awareness and denying or corrupting that of our adversary. Information operations are no longer a cost of doing business but presence and war-fighting methods in their own right. They substitute for force in some cases and increasingly serve as a multiplier when force is required. As principal operator of our nation's air and space information-gathering systems, we have stepped up to modernization challenges on behalf of joint war fighters.

This year saw development of an objective command, control, communications, computer, and intelligence (C⁴I) environment for the twenty-first century and a map to get there. Our proposal is not a grand design but a set of nested strategic plans that will allow rapid migration toward the goal—harmonizing efforts throughout the Department of Defense. The objective is a global network with

a worldwide information plug-in, common tactical pictures, bandwidth on demand for any application, in any form, to and from anywhere, allowing all war fighters to access the information they need.

This vision is already coalescing in the field. Our Space Warfare Center is bringing operations and support together from all services to make space support to the joint war fighter routine. We glimpsed what we are looking for in Haiti, where our space teams deployed in support of the joint force commander (JFC). For the first time, the JFC, National Military Command Center, and service operation centers viewed a common tactical picture displaying everything from readiness data to imagery and weather at the click of a button. The Air Force is making similar strides developing conceptual, doctrinal, and legal positions on information warfare (IW); incorporating IW into education, training, and exercise programs; and developing operational capabilities. One important step was establishment of the Air Force Information Warfare Center in 1993.

Modernization of information systems proceeds apace. Our space test program successfully flew 23 research experiments this year. We now have a fully operational constellation of 24 global positioning system (GPS) satellites; and the first military strategic and tactical relay satellite (MILSTAR) supported joint operations in Haiti. Our airborne information systems are also being modernized and netted to each other and to ground and space systems to produce large force-multiplying effects. Correspondingly, we are modernizing our users to make faster and better use of information. GPS modifications continue on all Air Force aircraft. Targeting information is finding its way from space and airborne sensors directly to the cockpit or smart weapon. Finally, our new mission support system is pulling together operational, weather, intelligence, threat data, and command and control information from all sources into portable workstations for Army and Air Force war fighters. These are

precisely the advances we need to fully exploit the capabilities of a much smaller military.

Space Launch

Information dominance depends on affordable access to space. We turned the corner in space launch this year. The year 1994 saw more than 20 successful launches, continuation of our Delta launch vehicle's 100 percent success story, and Titan IV's return to flight. We also submitted a space launch plan to the president and Congress to evolve our expendable launch systems and received funding for the first booster replacement in 30 years. Finally, we are enhancing national capabilities through cooperation with industry at Vandenberg AFB, California, and Cape Canaveral, Florida. This progress represents an essential beginning only. America's leadership in commercial space launch has declined from almost 100 percent of market share in the 1980s to 32 percent this year. If we do not continue to build on recent successes, the consequences for military and economic security could be serious.

The Way Ahead

Across the spectrum of peace and conflict, the Air Force exemplifies the ascendant role of air and space power in American security. Air and space power are fundamental to building US influence jointly and globally through presence. Likewise, air and space power increasingly underpin national capabilities to conduct decisive combat operations worldwide. Growing tension between expanding security requirements and dwindling resources will continue to challenge us in each

of our objective areas: remaining engaged, supporting our people, preserving combat readiness, and building for the future. But Air Force priorities within each area are clear and our plans to achieve them viable.

It is also clear, however, that this tension magnifies the importance of two imperatives for the future. First, solutions to our nation's security needs must be joint solutions. The Air Force strives to build a team within the team. Second, as technology and threats evolve, so must our views on strategy, doctrine, and roles and missions. The declining size of our military demands abandonment of the business-as-usual mind-set. Innovative thinking is key to reducing duplication and getting the most capability from our defense budget. To paraphrase General Shalikashvili, the combination of diminishing resources and a rapidly changing threat environment makes interservice trust more difficult and more important.

Let me conclude with a salute to our Air Force men and women. We have come a long way from Kitty Hawk to Vigilant Warrior, and during that journey, we have raised the sight of all mankind to the skies and to the stars. People did that. If I have learned anything in the last two years, it is that a strong American defense comes not from the building of gadgets but from the building of character. Every day, Air Force people are rewriting the script that reads "duty, honor, country." Over 800,000 airmen—uniformed and civilian, guard, active, and reserve—serving at 191 installations spanning the globe, have committed their lives in our nation's service. With them lies the promise that we will meet the challenges ahead and go beyond—casting America's watchful eye upon the globe, wielding her sword and shield and lending her helping hand.

WEAPONS of MASS PROTECTION

Nonlethality, Information Warfare, and Airpower in the Age of Chaos

CHRIS MORRIS, JANET MORRIS, THOMAS BAINES

AIRPOWER HAS become the first choice of policymakers and politicians around the world who must suggest how the international community should react to stop some infringement of the established order or crimes against humanity. Whether the threat be Serbian warplanes pounding Bosnian religious sites or a resurgence of Saddam Hussein's Iraqi adventurism, Somalian warlords firing on United Nations (UN) peacekeepers, or Rwandan refugees streaming across uncontrollable borders, the politically correct response when the United States or the international community must resort to force is always "air strikes." Why?

Because airpower seems to offer the potential of force projection without politically unacceptable risks, without risk of entering upon the "slippery slope" of long-term involvement characterized by the commitment of ground troops, without risk of US or coalition casualties in a casualty-averse world, and without massive logistical expenses and subsequent reconstruction costs.

Since airpower as currently deployable and constituted was designed for battle in a bipolar world, it cannot always successfully undertake the new roles and missions seen for it by politicians, policymakers, and diplomats. Service chiefs and mission planners alike must find new ways to fulfill decision makers'

expectations and the evolving requirements of a world no longer divided into two neat power blocs. Airpower has the potential to provide a credible deterrent and effective first response in today's conflict-rich environment. For airpower to afford such early, cost-effective, casualty-limiting, minimally destructive, logis-

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tically feasible ways to project power, it must be able to attain sharply constrained and multiplex objectives in multiple theaters simultaneously.

Nonlethality is the use of weapons of mass protection such as nonlethal and antilethal weapons and information warfare to project high-precision power in a timely fashion, delivering results that are life conserving, environmentally friendly, and fiscally responsible. Such weapons can provide airpower with capabilities that will yield new supports to diplomacy, a credible deterrent below the level of massive conventional force projection, and an expanded ability to meet evolving mission needs when used in conjunction with conventional force.¹

The ability to nonlethally overwhelm an enemy who is using lethal force has become a clear requirement for peacekeeping, peace enforcement, operations other than war, and military operations in built-up areas where minimum destruction of life and property are prerequisites for action. Airpower's capability to execute these new roles and missions where policy makers require decisive action to be undertaken in a timely fashion but always from the moral high ground and under media scrutiny is increasingly critical, has increasingly come into question, and must be reaffirmed. In order to maintain airpower's

position as a strategic capability of unparalleled effectiveness, planners must now re-evaluate the very nature of the world in which power will be projected and must begin to develop new doctrine and capabilities to fill those needs.

Acquiring weapons of mass protection—nonlethal, antilethal, and information warfare weapons—and integrating them into current force capabilities may be one way that airpower can secure for years to come its primacy in strategic utility for the post-cold-war conflict environment. In order to evaluate this thesis, we must reexamine the nature of warfare as it has evolved and its relation to policy in a world that has drastically changed over the last half century and especially in the last decade. We must also examine the potential difficulties of fielding nonlethal, antilethal, and information weapons in the new threat environment.

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An Age of Chaos

An unforeseeable consequence of the breakdown of the bipolar world has been to remove war from the purview of the dueling superpowers and to return it to the people. Transnational and subnational groups, rogue states and breakaway republics, civil war-mongers and tinhorn dictators, ethnic purists, and religious fundamentalists all see the inchoate environment of the post-cold-war world as an opportunity to seize or increase power. The result is an environment of spreading

destabilization that can be characterized as an age of chaos.

A New Class of Threat

The current chaotic environment of multiplex threats to the international rule of law is uniquely unresponsive to conventional diplomacy or war-fighting methodologies tooled for the cold war over nearly half a century. Taken one by one, the many disparate conflicts erupting among the former client states of the Soviet Union may seem unmanageable. Taken together as a new class of threat, these flash points can be viewed as the inevitable attempts of states built on the Soviet Union's "military-bureaucratic country" model to expand militarily in order to survive.² Unanswered questions about the relevance of chaotic destabilization of the former communist world to the national interests of the United States and other major powers in the developed world impede decision making. Ad hoc decisions to act made by policymakers are often disastrously unenforceable by the diplomatic or military components of nations or groups of allies.³

Quantifying the Threat

The greatest threat to the international rule of law in modern memory may be the spread of chaotic destabilization throughout the developing world. Unable to see these disparate threats as part of a single class of threat with effects greater than the sum of its parts, the United States and the international community fail to act decisively. As in the mathematical model of chaos theory, the number of discrete destabilizing events, nondestructive to the status quo when taken singly, may mount until their frequency causes a catastrophic shift in the nature of things—in this case, the balance of power in the world.⁴

Redefining Roles and Missions

Redefined roles and missions of not only

militaries but diplomatic corps and international entities such as the United Nations and the North Atlantic Treaty Organization (NATO), as well as the role of the United States as world leader and the single remaining superpower, are critical lest chaotic destabilization erode the credibility of the international community to maintain order and the rule of law. If faith in the ability of the world community to maintain order fails, the utility of all existing international and national entities comes into question. People will sustain their governments only as long as those governments maintain order and provide security and benefits to citizens at home and abroad.⁵

Recognizing the Problem

International consensus for action against destabilizing forces is difficult to achieve, and this very difficulty emboldens would-be aggressors who carefully calculate rationales for their violence, some hiring international public relations firms to make their cases for the world's media. Once these forces draw the attention of the world media, the attention of the international community, its governments, and their militaries invariably follows. Thus, the focus of world leaders on areas of crisis is primarily determined not by internal evaluation of the importance of any chaotic situation to the national security of the United States or other nations but by the

The focus of world leaders on areas of crisis is primarily determined not by internal evaluation of the importance of any chaotic situation to the national security of the United States or other nations but by the amount of media attention given to a crisis.

amount of media attention given to a crisis. Since this media coverage is often sought, courted, or even bought by aggressors, combatants, or defenders, the initiative in such situations is on the side of those who can command world attention. More and more international response to crises seems effectively media-driven. The ability of the developed world's conflict management bodies to set the agenda—to preempt crises with early and decisive diplomatic and unconventional action or to mitigate such crises with conventional methods—is demonstrably inadequate for a number of reasons:

- A given crisis may bear no apparent or direct relation or pose no imminent threat to one's own national security.
- Internal and international consensus for timely action is difficult to achieve because of varying evaluations of the seriousness of the threat.
- The roles, prerogatives, and utility of international instruments such as NATO or the UN in such crises are increasingly unclear.
- Internal pressures on nations to act in any such crisis vary in accordance with treaty obligations, commercial interests, and domestic constituencies developed for or against specific action.
- The developed world's intolerance of casualties when weighed against the casualty tolerance of the developing world, militates against the insertion of ground forces should a consensus for action be developed.
- Roles and missions of military and peacekeeping forces are inadequately defined both in unilateral and multilateral terms.
- Training, doctrine, and capabilities for such new roles and missions are consequently inadequate.

The result of these unsolved problems is that US and other policymakers wait too long to announce actions and then announce actions that may not be operationally or logistically feasible with the forces and weapons at hand.

Airpower and the Reality Gap

When the United States or its coalition partners wait too long to act and an international situation such as Bosnia has degenerated to a point where leaders must announce some action they think will restore their international respect and credibility, air power is the inevitable inheritor of the problem. In the United States, especially, elected officials continually call on airpower to project a US or US-led coalition force decisively from above in any situation where action is demanded but where the commitment of ground troops could lead to casualties or longer-term involvement, both of which are anathema to contemporary policymakers.

This situation has effectively eroded much of the credibility of the United States as a world leader, which was gained at such great cost during the cold war and the Persian Gulf War. The importance of that credibility is not simply a matter of US pride. US credibility is the primary security factor protecting US citizens and businesses around the world. Each time limited air strikes are undertaken by NATO or coalition forces with indeterminate results, the damage to US and international security establishments' credibility is greater than it is to that of the declared enemy. Each time US leaders promise swift action by air in circumstances that are operationally impractical, US resolve and international prestige are eroded, leading to increasing danger for all US citizens abroad.

A particular problem for airpower inherent in the larger geopolitical situation is that the utility of airpower itself comes into question each time the US Air Force must mitigate policymakers' zeal for impractical action.

Recognizing the New Imperatives of the Age of Chaos

The shared imperatives of the world community in the age of chaos are several and conflicting:

- To enforce the international rule of law,



The politically correct response when the US or the international community must resort to force is always "air strikes" because airpower offers the potential of force projection without politically unacceptable risks. However, airpower as it is now constituted was designed for battle in a bipolar world and cannot always successfully undertake the new roles and missions seen for it by politicians, policymakers, and diplomats.

- To maintain the credibility of international institutions,
- To assure human rights,
- To defend the viability of international trade,
- To protect the ecology and environment, and
- To ensure national sovereignties.

The imperatives of the United States in the age of chaos are divergent:

- To ensure the national security of the United States,
- To maintain US world leadership,
- To sustain the rule of law,
- To project power to enforce policy while limiting casualties and damage,
- To satisfy US ethnic constituencies and international treaty signatories, and

- To create a climate of safety for globalized US trading interests.

To the extent that these interests converge, coalition action is possible. To the extent that US interests, which are internally consistent, diverge from the interests of our allies, which are sometimes inconsistent, the United States must decide in each case whether to lead or to defer.

Such decisions are in no small part based on the *capability to act*. Acting in the current international milieu described above means acting in a highly constrained environment very different from that of the cold-war era, an environment that requires the ability to do the following:

- Act in a timely fashion.
- Act decisively while limiting casualties and damage to the environment.

- Act below the threshold of war and without risking long-term involvement in a politically unsustainable ground war.
- Act effectively in an urban or complex environment where enemies and noncombatants are mixed.
- Act while claiming the moral high ground under constant media scrutiny.
- Act in pursuit of clear mission goals with high precision.
- Act effectively without risking US casualties.
- Use the threat of US military action as a credible deterrent.

A Short History of War as an Instrument of Societal Change

Historically, war has been redefined by societies struggling with their leadership roles. More than 2,400 years ago, Sun Tzu counseled in *The Art of War* that armed force was to be applied so that victory would be gained (a) in the shortest possible time, (b) at the least possible cost in lives and effort, and (c) with the infliction on the enemy of the fewest possible casualties. He also stated that "to fight and conquer in all your battles is not supreme excellence; supreme excellence consists in breaking the enemy's resistance without fighting" and that "the skillful leader subdues the enemy's troops without any fighting; he captures their cities without laying siege to them; he overthrows their kingdoms without lengthy operations in the field."⁶

Sun Tzu was committed to the economic principles underlying the conduct of war in his time. People, even enemy people, had great value as potential workers and taxable citizens; human and natural resources were the primary prize in warfare; and goods and services were coveted booty, as were physical property and societal infrastructure.

In A.D. 1513, Niccolo Machiavelli observed in *The Prince* that

there is nothing more difficult to take in hand, more perilous to conduct, or more uncertain of success than to take the lead in the introduction of a new order of things, because the innovator has for enemies all those who have done well under the old condition, and lukewarm defenders in those who may do well under the new.⁷

Later, in *The Discourses* he wrote that

the object of those who make war, either from choice or ambition, is to conquer and to maintain their conquests, and to do this in such a manner as to enrich themselves and not to impoverish the conquered country. To do this, then, the conqueror should take care not to spend too much, and in all things look mainly to the public benefit; and therefore he should imitate the manner and conduct of the Romans, which was first of all to 'make war short and sharp.' . . . Whoever desires constant success must change his conduct with the times.⁸

Like Sun Tzu, Machiavelli and his beloved Roman forebears saw war as a way to extend the boundaries of physical empire, to enrich and strengthen his society with the people, natural resources, and physical attributes of the lands to be conquered and absorbed. Even in a time of great change and turmoil, the basis for war was still economic. In A.D. 1690, John Locke wrote in *The Second Treatise of Government* that

the state of war is a state of enmity and destruction . . . it being reasonable and just that I should have the right to destroy that which threatens me with destruction; for, by the fundamental law of nature, man being to be preserved as much as possible when all cannot be preserved, the safety of the innocent is to be preserved Want of a common judge with authority puts all men in a state of nature; force without right upon a man's person makes a state of war both where there is and is not a common judge.⁹

John Locke lived in a time of wars of attrition, when early war-fighting technology had matured until total destruction of all assets and persons of a society was not simply possible but probable. War by Locke's time was something that had to be limited by laws—

either God's law or man's law—and a process that put at risk both innocents and desirable assets of warring societies. Populations are dense and people have less inherent value. The economic basis of war is beginning to be replaced by wars of ideology.

On 10 July 1827, Carl von Clausewitz said in *On War* that war is nothing but a continuation of policy by other means.¹⁰ Clausewitz marks the maturation of "modern" wars of conquest in which war has become an instrument of statecraft among nations whose goals may be imperialistic, nationalistic, economic, ideological, or some combination of all four. The laws of the state have replaced the laws of God and man as adjudicator. The benefit of war is dependent on the wisdom of policy. The goals of war are not self-evident but are determined by the goals of the state.

If Clausewitz were alive today he might add that the main and self-justifying mission of the military is to make policy enforceable. Failing that, the military or any branch of it may risk its own continued survival since it exists at the sufferance of the state and ultimately of the people who fund the state so long as the state serves its people.

Defining War in the Age of Chaos

In modern American military thought, war is usually defined qualitatively. War is limited, such as in the Persian Gulf War, or war is unlimited, as in World War II. "Unlimited war implies that the objective is the complete destruction of the enemy's war-making ability or unconditional surrender. . . . Limited war implies objectives short of the complete destruction of the enemy."¹¹ At the end of the twentieth century, war can and should also be defined chronologically as an evolutionary procession shaped by the geopolitical climate in each of three eras.

The Era of Wars of Conquest, 2800 B.C.—A.D. 1945. From the conquests of Sargon of Akkad in Mesopotamia to Adolf Hitler's dreams of an Aryan hegemony, wars of conquest were predicated on the conquering

state gaining economic and strategic benefit by acquiring the land, physical assets, and populace of others in order to increase its size and wealth, assert its dominance, and ensure its security. Destruction of an enemy replaced absorption of the enemy. Genocide became more commonplace as societies became more populated and the value of human life went down. Occupation of enemy territory became progressively less synonymous with conservation of his cultural assets since one goal of wars of conquest was to impose a cultural hegemony and another was to replace the dominance of one race over an area with the dominance of another race. By the time of World War I, scorched-earth warfare became an accepted tool of statecraft. Because of the relative slowness of societal and technological change and the inherent conservation of assets involved in wars of conquest, this era was a prolonged one.

The Era of Wars of Deterrence, 1946–1989. The cold-war epoch, which ended with the fall of the Berlin Wall at the close of 1989, demarcates a time of wars of deterrence in which countries built weapons of great and of mass destruction whose use was primarily as a deterrent to aggression. Ensuring the survival of the state was the military's greatest goal. The most important task of the military was to contain the spread of rival ideologies. The era of wars of deterrence was predicated on a doctrine of mutually assured destruction and was marked by nuclear proliferation. This was an era in which war itself was of no economic benefit, but client states and wartime economies fueled international growth, and it was a time in which the value of war was the strength it gave to wartime economies. This era was shaped by the industrial age and the capabilities that produced it. The original economic fundamentals underlying wars of conquest were completely eradicated and replaced with a doctrine of state survival that saw acquisition of enemy assets as immaterial and that required its military to be able to completely destroy not only the people but the physical assets of its enemies. This era was brief because of its lack of a sustainable

economic goal and the speed of technological change.

The Era of Wars of Divestiture, 1990— Wars of divestiture, the first of which was the Persian Gulf War, are wars of sharply limited scope whose economic rationale is the restoration of the rule of law and the status quo of free trade. The international community rallies to restore order, and the goal of the war is not the eradication of a regime or state but the divestiture of an aggressor's war-making capability and his ability to threaten the world order through wars of conquest. The goal of the state in this era is the maintenance of order and, through its military, the protection of the status quo or the restoration of the status quo ante. The goal of the military thus becomes the preservation of sovereign rights and the protection of innocents and preservation of the environment from destruction caused by wars of conquest or wars of deterrence. This era is marked by rapid, interdependent technological and geopolitical change in which geopolitical

A paradigm shift in international behavior has created a new area of military action between the point where conventional diplomacy fails and a declared war begins. Concomitant with this shift has come a lowering of the threshold of war itself.

stability is measured by the stability of the rule of law. The length of this era will be dependent on the military's ability to ensure a stable rule of law through unilateral, coalition, and international action.

Because wars of divestiture take place in an environment marked by constraints—particularly due to the presence of the media—and chaotic destabilization, both the political and military communities are

struggling to come to grips with the implications of setting precedents on an ad hoc basis, without an articulated framework.

Yet, analysis quickly yields numerous cases in point of more or less successful wars of divestiture. The Persian Gulf, Somalia, Haiti, and Bosnia all are examples of wars of divestiture despite the fact that all but the Persian Gulf War have occurred below the threshold of war as it is currently perceived.

A Lowering Threshold of War

A paradigm shift in international behavior has created a new area of military action between the point where conventional diplomacy fails and a declared war begins. Concomitant with this shift has come a lowering of the threshold of war itself. Reasons for military action are different than they were during the era of conquest or the era of deterrence. We may call these military actions peacekeeping, operations other than war, military operations in built-up areas, or any other politically popular term. The reality is that our military—and especially our airpower—is increasingly called upon to act. In this new area of military action, US casualties are unacceptable, enemy casualties and collateral damage must be minimized, and the goal of missions is political (such as restoring order or democracy, limiting humanitarian abuse, or reducing but not eradicating a threat) rather than military action in the classical sense—destruction of an enemy or conquest of his territory as a prelude to absorbing his assets.

Since acts of war must be ratified by Congress, US policymakers are hesitant to come to grips with this new reality. When it is admitted that the threshold of war is lowering, Congress may act to preserve its prerogative to “advise and consent” below the current threshold at which its consent is required. Until that time, ad hoc policies and unclear mission definitions will prevail for political reasons, despite the difficulties this

poses for our military, particularly for airpower, which is consistently called upon by political leaders to act—often impractically—to project military power in pursuit of political objectives that may or may not bear directly on national security.

And yet, all classical definitions of war imply that a military that cannot enforce policy has failed in its purpose. Therefore, a unique set of problems is developing for airpower and for all other military forces in this new conflict environment. The impractical must be made practical. The military, and especially airpower, must learn how to project power that is hyperaccurate yet minimally destructive, limited while being overwhelming, and effective against lethal force, yet nonlethal. Out of these seeming contradictions will come a new set of doctrinal tenets and operational requirements that serve the overriding requirement of policymakers in today's world.

This requirement of policymakers—to have at their disposal a new, highly effective, cost-efficient force equipped with weapons tailored to today's limited conflicts—does not end with force projection. The ability of our military to project limited force must be such that the very limitation of this force must be seen as a credible deterrent because the qualitative nature of the force available to the military allows the military to act earlier, and decisively, against aggression while limiting casualties and damage to the environment.

Airpower and the New Missions

If war is now most critically an extension of policy, then the military's main mission must be to make policy enforceable across the operational continuum. To fail repeatedly in this is to call the value of a standing military into question. Therefore, military planners must look squarely at the geopolitical de-

mands shaping policymakers' needs and be ready to meet those needs.

Of all branches of the military, the Air Force is the service most challenged by these new mission areas and the new requirements

To architects of air wars, this propensity of US officials to call for air strikes in any and all situations is more than problematical; it is dangerous to US Air Force cohesion and perhaps to the future of the service itself.

of policymakers. To a policymaker, airpower seems to offer easy answers to hard questions of how to project US power without risking US lives or involvement in protracted ground wars. To architects of air wars, this propensity of US officials to call for air strikes in any and all situations is more than problematical; it is dangerous to US Air Force cohesion and perhaps to the future of the service itself. A military service that cannot serve the needs of policymakers risks its *raison d'être*.

As has been shown since 1990, first with the success of the air war in the Persian Gulf and later with unsuccessful attempts to use airpower decisively in Bosnia and against the Serbs, these new missions are paramount to US national security interests whenever US credibility—US resolve and ability to act—come into question. This conclusion cannot be avoided indefinitely. Although war planners of all services would prefer not to engage in missions of such demanding constraint as seem to be required by wars of divestiture, there is a growing need to counter chaotic destabilization by projecting power to enforce policy.

Therefore, the Air Force must look seriously at the way policymakers have clearly indicated that they wish to use airpower now and in the future and must find ways to meet

the requirements of new roles and missions. Currently, many would argue that combined ground and air operations are limited to the operational and tactical levels. In the politically constrained environments of the future, airpower and ground power must be strategically applied to achieve our political objectives. Consequently, development of weapons of mass protection for the Air Force should be approached as part of a joint effort that also considers capabilities for ground forces and issues of interoperability.¹²

Nonlethal, Antilethal, and Information Weapons in the Age of Chaos

The ancient weapons of chariot and cavalry warfare, the siege engines of Greek and Roman technology, the naphtha fireballs of the fifteenth century A.D., the horse-drawn cannon, the machine gun, the mechanized tank, and the early fighters and bombers of World War II—these have given way first to weapons of mass destruction and then to electronically guided weapons of high precision.

As early as the Persian Gulf War, weapons of mass *protection* were coming into use as a means of destroying enemy command and control. The first 48 hours of the Gulf War showed beyond a doubt that electronic warfare technologies could keep US servicemen safe from enemy fire by denying the enemy the use of his command, control, communications and intelligence (C³I) capability.

Nonlethality (the theory that overwhelming nonlethal force could be used to defeat lethal force) and nonlethal weapons first received serious notice after their use in the Persian Gulf War. Carbon circlets were dropped on Iraqi power stations to deny electricity to the enemy, obscurants were used to deny the enemy targeting information about US troop movements, and electromagnetic weapons—reportedly including nonnuclear electromagnetic pulse—were used successfully to limit casualties, as President George

Bush and Prime Minister John Major of the United Kingdom had publicly directed.

Nonlethal weapons (defined as weapons whose intent is to nonlethally overwhelm an enemy's lethal force by destroying the aggressive capability of his weapons and temporarily neutralizing his soldiers) will give the United States new options in peacekeeping and conventional force projection, as well as new supports to diplomacy and a credible deterrent below the level of massive conventional force projection.¹³ Nonlethality posits that the world community has become averse to casualties and that the West, and the United States as leader of the world community, must develop and be ready, willing, and able to deploy decisive nonlethal weapons in situations where casualty-tolerant rogue states and subnational or pannational groups must be stopped by casualty-intolerant coalition forces. Nonlethality requires no massive investment in new technology but a reevaluation and redirection of mature research programs into the weaponization and the fielding of usable systems that conserve life and are environmentally friendly and fiscally responsible. Nonlethality further posits that the technologies that yield nonlethal systems will comprise a real peace dividend.¹⁴

Nonlethality categorizes nonlethal weapons as (1) antipersonnel or antimateriel; (2) electromagnetic, kinetic, or chemical; and (3) nonlethal and antilethal. Among technologies identified as nonlethal are acoustic, laser, high-power (HP) microwave; nonnuclear electromagnetic pulse; HP jamming; obscurants; foams; glues and slicks; supercaustics; magnetohydrodynamics; information warfare; and soldier protection. Among technologies identified as antilethal are counter-sniper, countermortar, antimissile, and high-precision weapons, including low collateral damage kinetic munitions with reduced lethality.

Nonlethal technologies require the simultaneous development of countermeasures and antifraticide because of the vulnerability of humans and, the weapons of the high-technology battlefield to nonlethal weapons. The

value of nonlethality is presumed to be greatest to two critical users: the political decision maker, who must decide how and when to act, and the field commander, who must carry out the orders of the decision maker.

A key value and important policy issue central to nonlethality is the ability of nonlethal weapons to allow a nation equipped with them to act earlier against a threat. This same capability brings into question the level of international and, in the United States, congressional control over a state's ability to venture below the threshold of war.¹⁵

Nonlethal Weapons, Information Warfare, and the Problem of Provocation without Decisiveness

Information warfare, a subset of nonlethality, traces its independent existence directly to the success of electronic warfare during the Gulf War. In *Nonlethality: A Global Strategy*, the authors listed information warfare as a subset of nonlethality. Today, information warfare has its own bureaucratic institutionalization and its own user base, funding, and constituency. It has these because electronic warfare proved overwhelmingly successful during the Gulf War. However, information warfare does not have a generally accepted conceptual structure outlining its utilities and attributes, as does nonlethality. Therefore, the authors will treat information warfare as sharing the same general attributes and strategic values as other nonlethal and antilethal weapons.

Information warfare technologies do differ from some other nonlethal and antilethal technologies in that information warfare technologies can seldom if ever be used alone. Because of this, we have chosen information warfare as our example in examining critical issues of geopolitical usability.

To be of consequence, any new defense technology must be useful, usable, and

used.¹⁶ It must have political utility. It must be legal. It must be moral in a milieu in which all military actions are subject to scrutiny by the media and the international community. It must be effective. It must be a superior choice to meet a policy objective. It must be dependable. It must produce the desired result. It must be short, sharp, successful, and economical. Most of all, it must be decisive or contribute to a decisive victory or a desired outcome, even if that outcome is deterrence or show of force.

Information warfare technologies are those that deny, deform, destroy, or disable the enemy's communications and targeting capabilities. They may also be designed to act upon infrastructure points and therefore upon noncombatants. Some information warfare technologies are mature but classified. Others are conceptually obvious but are still in the design stage. Still others have been available since the height of the cold war but have never been used for fear that their use might be too provocative in an arena where consequences and repercussions are still murky.

International policymakers and weaponers alike must consider four issues—legality, decisiveness, effectiveness against new forms of aggression, and proliferation—when considering the use of information and other nonlethal and antilethal weapons, especially in actions below the threshold of war.

Legality

What actions made possible by new capabilities will be legal under international law? Some existing treaties predate but prohibit the use of information warfare technologies that belong to the electromagnetic spectrum of weapons. Chemical nonlethal weapons (riot control agents) risk a similar fate because of the draft Chemical Warfare Convention which may soon be ratified by the US Senate.

Decisiveness

Which new operational capabilities offer decisive advantages, either when used alone or in concert with conventional force, and which are too provocative to provide real utility? Information warfare brings to the policymaker and diplomat the most serious problems of decisiveness that exist among the nonlethal arsenal. It may be tempting to intercept and deform another nation's communications and send those messages on their way with new information inserted, but circumstances in which such tactics alone will provide a deterrent or a decisive victory will be rare. It may be attractive to use information warfare to deny a rogue state access to internationally banked funds, but such actions may be unacceptably provocative in the eyes of the international community. Communications or banking embargoes are now possible, but the results of imposing them may be unclear.¹⁷

Defense against New Forms of Aggression

What new capabilities must we develop in order to have defenses against their use by rogue states or international criminals? Both issues noted directly above may limit or slow US or Western development or use of new kinds of weaponry. However, neither legality nor decisiveness will deter rogue states, terrorists, and subnational and pannational groups of religious fundamentalists, cultural separatists, or ideologues of any sort from building and using information weapons as well as some types of nonlethal and antilethal weapons that can be configured from off-the-shelf components and that require no technological expertise or hardware that is effectively restrictable. Only the creation of a nonlethal, antilethal, and information arsenal can convey to the West the expertise needed to develop and deploy effective countermeasures against

nonlethal, antilethal, or information warfare attack, especially attacks on our woefully vulnerable banking and communications systems.

Proliferation

What technologies will inevitably proliferate because of their mature nature, and how should the international community acknowledge and deal with the proliferation of new and evolving nonlethal and antilethal capabilities that impact international security? Information weapons have already proliferated beyond hope of containment. The personal computer, the telephone, the modem, the Internet—all are at the heart of modern man's daily life. Attempts to put mediating electronics in new defensive systems cannot address this vast vulnerability. Information warfare is already the domain of computer hackers. Its weapons are available worldwide. Its systems can be cobbled together from electronics stores on the streets of any city in the world or can be ordered by mail. Banking and communications security can only be ensured by new and stringent efforts to develop proprietary safeguards, countermeasures, and antifratricide and share them not only with our allies but with our interdependent commercial enterprises worldwide. Other nonlethal technologies with even more aggressive capabilities, such as high-power microwave weapons, can be constructed from easily obtainable commercial components. As the information highway makes technology more accessible, this trend can only continue to grow.

In the Age of Chaos, What Constitutes an Act of War?

These examples are but a few of many cases that illustrate that nonlethal weapons, and especially information warfare technologies, bring into question as never before the issue of what constitutes an act of war. Unless and

until we wish to use nonlethal and information warfare technologies alone against an enemy, this question may seem immaterial since all nonlethal technologies, including information warfare, used in conventional operations have the potential to provide new and needed options to military planners. However, as deterrence and allied shows of force become more commonplace, this question of what defines an act of war takes on increasing immediacy. If we accept that the threshold of war is being lowered and that new technologies will provide new options to war planners, we must accept the necessity of redefining the act of war itself.

When we are using nonlethal, antilethal, and information weapons in concert with conventional weapons for peacekeeping or in pursuit of clear national objectives, such new technologies and new operational strategies and tactics yield no such difficulties. In such cases, nonlethality can provide commanders with new ways to meet mission objectives and allow diplomats and policymakers to act in an area of warfare heretofore inaccessible—that area between the moment that diplomacy fails and a shooting war begins.¹⁸

Nonlethality and a New Strategic Doctrine

The way we insert nonlethal and information warfare technologies into our force mix will be critical issues linked to the adoption of a new strategic doctrine suited to the evolving geopolitical climate. That doctrine may well be the containment of barbarism or the containment of conflict itself, a possibility only if the world community acknowledges the true nature of the current geopolitical climate and chooses to act aggressively not only for self-preservation but for the protection of human rights. The articulation of any such new strategic doctrine that can be shared by the world community will be based partly on the re-

alization that nonlethal, antilethal, and information weapons comprise a new category of weaponry—weapons of mass protection.

Weapons of Mass Protection

Nonlethal, antilethal, and information weapons form a new arsenal for a new era of warfare, an arsenal that can generally be termed *weapons of mass protection*. Weapons of mass protection are weapons that can be used earlier to deter by denial¹⁹ in order to support diplomacy, to limit aggression, to nonlethally disarm or dissuade, and to destroy lethal capability with a minimum of damage to non-combatants, combatants, and the environment. Weapons of mass protection may include nonlethal weapons, antilethal weapons, and conventional weapons. They may be electromagnetic, kinetic, or nonlethal chemical.

Weapons of mass protection have broad utility in that they meet the following constraints imposed by the new geopolitical climate on policymakers and military planners:

- Limit casualties and environmental and collateral damage.
- Act earlier and decisively in defense of human life.
- Minimize reconstruction costs.
- Deter by denial.
- Restore a credible threat of effective action.
- Enforce the rule of law.
- Maintain the moral high ground.
- Protect lives of US and allied personnel.

Useful, Usable, and Used

We have noted that weapons, to be viable, must be useful, usable, and used. To be relevant, armed services must be able to deliver the required intensity and type of force to the target in such a way as to deliver the desired result to the policymaker. When this result is a cessation of hostilities or a divestiture of the ability to threaten aggression rather than complete

surrender or unequivocal victory, new methods must be made available to the military planner so that the goals of the policymaker can be met.

Airpower and Nonlethality

Airpower is clearly the first choice of policymakers when contemplating timely action abroad. The US Air Force can utilize existing technology and weapons platforms to develop new capabilities that will provide policymakers with the tools necessary for timely action in the new area between conventional diplomacy and warfare. These tools can and must be a mixture of precision kinetic, nonlethal chemical, and electromagnetic weapons that are legal, ethical, humane, and effective. Since potential enemies will be using lethal force when US or allied forces act to overwhelm that lethal force with weapons of mass protection, it is important that the capabilities of nonlethal, antilethal, and information warfare technologies be known and understood not only by policymakers but by aggressors, both for the potential deterrent effect and to demonstrate that fear of casualties will not stop the US or allies from acting.

Most of the flash points of chaotic destabilization are client states of the former USSR. Airpower can reach these venues in a timely fashion and with a less-troubling level of troop commitment as far as Congress is concerned. Whether air planners will take up the challenge and adapt their technologies and platforms to these new missions may be the question that determines the future of airpower in the coming century.

Notes

1. Janet Morris and Chris Morris, *Nonlethality: A Global Strategy* (West Hyannis Port, Mass.: Morris & Morris, 1990, 1994).
2. Janet Morris, Victor Krivorotov, Chris Morris, *The Age of Chaos* (West Hyannis Port, Mass.: Morris & Morris, 1992).
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SUMMARY

The age of chaos has created new demands on policymakers and war planners alike. Wars of divestiture, which may occur far below the previous threshold of war, provide a new challenge to the United States. Weapons of mass protection can be developed that will allow the United States to assert its leadership while holding a moral high ground internationally. Airpower holds the key to timely delivery of weapons of mass protection in ways that will create new supports to diplomacy, a new deterrent below the level of massive conventional force projection, and enhanced, politically usable conventional force with which to meet the challenges of the chaotically destabilized, media-scrutinized environment. The basic values inherent in airpower—deep penetration, broad reach, precision delivery, early entry—must be augmented with the ability to carry payloads whose results enforce policy throughout the operational continuum in ways suitable to the needs of decision makers in this age of chaos. Wars of divestiture have at their core the aim of restoring order with minimum destruction. Weapons of mass protection have a political utility that encompasses the changed environment for warfare and allows the United States to enforce its policies when necessary, thereby exercising its role as world leader. Airpower, demonstrably the first choice for early action by US decision makers, can project nonlethal, antilethal, and information warfare while conserving lives, limiting destruction, and deterring by denial, thus helping to chart the course of US military power in this new and evolving action area.

4. Chris Morris and Janet Morris, *Nonlethality and Psyops* (West Hyannis Port, Mass.: Morris & Morris, 1993).

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12. From a briefing presented by Charles Swett (ASD/SOLIC/PP) and Donald Henry (OUSDA/S&T/OM) to the National Defense University, 17 November 1994; and conversation of authors with Col Thomas M. Kearney, USAF,

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13. Chris Morris and Janet Morris, *Nonlethality: An Overview* (West Hyannis Port, Mass.: Morris & Morris, 1994).

14. From a series of discussions with Thomas Moore, professional staff member, Senate Armed Services Committee staff, 1994.

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16. Thomas B. Baines, *Information Operations in War* (unpublished paper, 1994).

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19. Ibid.



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SUN TZU

INFORMATION WARFARE

PROF GEORGE J. STEIN

WE NEED TO state up front that much of what is discussed in this essay on information warfare is unofficial speculation. There is no official, open-source US government definition of information warfare. The Department of Defense calls its current thinking and approach to information warfare “command and control warfare” (C²W).¹ There is little agreement among the services about either information warfare or C²W; and among civilian defense analysts looking at the issues of information warfare, there is even less agreement. Why, then, should we be thinking about this new and strange idea? The chief reason, of course, is

that while we don’t know just what we’ve got here, all the services agree that information warfare is something important.² Was Desert Storm the first war of third-wave information warfare or the last war of mechanized second-wave industrial warfare?³ We’re not sure, but a lot of people, including potential rivals, are trying to figure it out.⁴ This article attempts to make some sense of this new idea called information warfare. We’ll look at four sets of ideas: (1) a definition of information warfare; (2) how we should start thinking about developing a strategy of information warfare; (3) why current Air Force doctrine may be the best framework for developing a doctrine of in-

formation warfare; and (4) a very brief comment on the danger of failing to develop information warfare.

Defining Information Warfare

Information warfare, in its largest sense, is simply the use of information to achieve our national objectives. Like diplomacy, economic competition, or the use of military force, information in itself is a key aspect of national power and, more importantly, is becoming an increasingly vital national resource that supports diplomacy, economic competition, and the effective employment of military forces. Information warfare in this sense can be seen as societal-level or nation-to-nation conflict waged, in part, through the worldwide internetworked and interconnected means of information and communication.⁵ What this means is that information warfare, in its most fundamental sense, is the emerging "theater" in which future nation-against-nation conflict at the *strategic* level is most likely to occur. Information warfare is also changing the way theater or operational-level combat and everyday military activi-

Information warfare... is fundamentally not about satellites, wires, and computers. It is about influencing human beings and the decisions they make.

ties are conducted. Finally, information warfare may be the theater in which "operations other than war" are conducted, especially as it may permit the United States to accomplish some important national security goals without the need for forward-deployed military forces in every corner of the planet. Information warfare, then, may de-

fine future warfare or, to put it another way, be the central focus for thinking about conflict in the future.

Information warfare, in its essence, is about *ideas and epistemology*—big words meaning that information warfare is about the way humans think and, more importantly, the way humans make decisions. And although information warfare would be waged largely, but not entirely, through the communication nets of a society or its military, it is fundamentally not about satellites, wires, and computers. It is about influencing human beings and the decisions they make. The greatest single threat faced by the Air Force—and by the services in general, as we begin to think about information warfare—is that we will yield to our usual temptation to adopt the new technologies, especially information technologies, as merely force multipliers for the current way we do business.⁶ It would be a strategic mistake of historical proportions to focus narrowly on the technologies; force the technologies of information warfare to fit familiar, internally defined models like speed, precision, and lethality; and miss the vision and opportunity for a genuine military revolution. Information warfare is real warfare; it is about using information to create such a mismatch between us and an opponent that, as Sun Tzu would argue, the opponent's *strategy* is defeated before his first forces can be deployed or his first shots fired.

The target of information warfare, then, is the human mind, especially those minds that make the key decisions of war or peace and, from the military perspective, those minds that make the key decisions on if, when, and how to employ the assets and capabilities embedded in their strategic structures. One could argue that certain aspects of the cold war such as Radio Free Europe, Radio Martí, or the US Information Agency were a dress rehearsal for information warfare. One could argue that certain current capabilities in psychological operations (PSYOP), public affairs and civil affairs, to-

gether with the intelligence agencies, satellite drivers, communications specialists, computer wizards, and the men and women in agencies like the Air Intelligence Agency or the new Joint Information Warfare Center, represent some of the key learning environments in which we'll develop some of the new capabilities for information warfare.⁷ And while the concept of information warfare in its computer, electronic warfare, and communications net version is most familiar in military operations involving traditional state-to-state conflict, there are new and dangerous players in "cyberspace"—the battlefield for information warfare. There has been a proliferation of such players—nonstate political actors such as Greenpeace, Amnesty International, rogue computer hackers like the Legion of Doom, some third world "rebel" who stages a "human rights abuse" for the Cable News Network (CNN), or ideological/religious inspired terrorists with easy access to worldwide computer and communications networks to influence, to exchange information, or to coordinate political action on a global basis. All of this suggests that the military or governments of a traditional nation-state may not be the only serious threat to our security or the driver of our national security politics.⁸ Cyberspace may be the new "battlespace," but the battle remains the battle for the mind. There must be no confusion of the battlespace with the battle.

Let's take a look at this in a context we think we're familiar with: propaganda as an effort to influence national morale and support for the nation's armed forces. The Vietnam War taught us the consequences of winning every battle in the field and losing the information war on the home front. Before the advent of information warfare, propaganda was traditionally targeted through various mass media to influence a mass audience. One key change made possible by the new technologies is the potential for customized propaganda. Those who have received individually targeted political advertising from a company specializing in

"niche" marketing research must have had a momentary shudder when they realized that there are private companies who seem to know everything about their buying habits and tastes, whether they support the National Rifle Association or attend Tailhook conventions, and what television shows they watch. Every credit card purchase adds data to someone's resources, and not everybody is selling just soap or politicians. Contemporary public and commercial databases and the constantly expanding number of sources, media, and channels for the transmission of information, essentially available to anyone with a bit of money or skill, have created the opportunity and "target sets" for custom-tailored information warfare attacks on, to take just one example, the families of deployed military personnel. Think about the morale implications of that for a minute. Computer bulletin boards, cellular telephones, video cameras, and fax machines—all of these provide entry points and dissemination nets for customized propaganda assaults by our opponents on military, governmental, economic, key civilian strategic structures, or even the home checking accounts of deployed troops.⁹ Operations security (OPSEC) is increasingly a most vital military security issue. However, information warfare should not be confused with or limited to just propaganda, deception, or traditional electronic warfare.

A major new factor in information war is the worldwide infosphere of television and broadcast news. Information warfare at the strategic level is the "battle off the battlefield" to shape the political context of the conflict. It will define the new "battlespace." We face an "integrated battlefield," not in the usual sense of having a global positioning system (GPS) receiver in every tank or cockpit but in the Clausewitzian sense that war is being integrated into the political almost simultaneously with the battle. Many people suspect that the national command authorities (NCA) are in danger of becoming increasingly "reactive" to a "fictive" universe created by CNN, its

various international competitors, or even a terrorist with a video camera.¹⁰ This media-created universe we live in is fictive rather than "fictional" because although what we see on CNN is "true," it is just not the whole, relevant, or contextual truth. Nevertheless, this fictive universe becomes the politically relevant universe in which the government or the armed forces are supposed to "do something." Members of Congress, the national command authorities,

Developing a strategy of information warfare starts with serious, creative, and "color-outside-the-lines" thinking. . . .

and our mothers all watch the "instant news" followed by "instant" second-guessing commentary. This is increasingly the commander's nightmare. First, 15 congressmen are calling the chairman of the Joint Chiefs of Staff to ask whether retired admiral so-and-so's critical analysis on "Nightline" of the CINC's ongoing theater air campaign is valid. More importantly, 300 congressmen are also getting 10,000 calls, E-mails, faxes, and even letters from angry families who've just seen the television report (carefully "leaked" to French television by an unhappy defense contractor and innocently repeated by CNN) that the US military-issue antimalaria pills don't work in Bongo-Bongo. All this without the real "bad guys" trying their hand at information war. Use your imagination. Somalia gets in the news, and we get into Somalia despite the reality of equally disastrous starvation, disorder, and rapine right next door in Sudan. The truth is that there were no reporters with "skylink" in Sudan because the government of Sudan issued no visas to CNN reporters. We all know the impact of the pictures of the failed raid to capture Mo-

hamed Farah Aidid in Somalia. The potential, then, for governments, militaries, parties in a civil war such as Bosnia, or even religious fanatics to manipulate the multimedia, multisource fictive universe of "the battle off the battlefield" for strategic information dominance should be obvious.¹¹ The armed services are just beginning to think about how these new technologies of instant communication will change the battlespace, and, quite frankly, there are not many good answers yet.

Fictive or fictional operational environments, then, whether mass-targeted or niche-targeted, can be generated, transmitted, distributed, or broadcast by governments or all sorts of players through increasingly diversified networks. The information war potential available to states or other players with access to the universe of internetted communications to use the networks over which banking information is transmitted to suggest that a "hostile" state is about to devalue its currency could easily provoke financial chaos.¹² Direct satellite radio or television broadcasts to selected audiences, analogous to central control of pay-per-view programs, again offers the potential for people in one province or region of a targeted state to discover that the maximum leader has decided to purge soldiers from their clan or tribe from the army. Your own imagination can provide many examples of how the increasingly multisource communications systems offer both the armed forces and the national command authorities countless new possibilities for societal-level information warfare to shape the information battlespace to our advantage.

Let us take just one example of how current technologies could be used for strategic-level information warfare. If, say, the capabilities of already well-known Hollywood technologies to simulate reality were added to our arsenal, a genuinely revolutionary new form of warfare would become possible. Today, the techniques of combining live actors with computer-generated

video graphics can easily create a "virtual" news conference, summit meeting, or perhaps even a battle that would exist in "effect" though not in physical fact. Stored video images can be recombined or "morphed" endlessly to produce any effect chosen. This moves well beyond traditional military deception, and now, perhaps, "pictures" will be worth a thousand tanks. Imagine the effect of a nationwide broadcast in banditland of the meeting between the "digitized" maximum leader and a "digitized" Jimmy Carter in which all loyal soldiers are told to cease fighting and return to their homes. The targets of information warfare, remember, are the decisions in the opponent's mind, and the battlespace of the human mind is also the zone of illusion.

Let's play with this a bit. Through hitching a ride on an unsuspecting commercial satellite, a fictive simulation is broadcast. This may not be science fiction, and readers of Tom Clancy's latest novel *Debt of Honor* will suspect it's not. Simultaneously, various "info-niches" in the target state are accessed via the net. Some of the targets receive reinforcement for the fictive simulation; others receive slightly misleading variations of the target state's anticipated responses, and the whole of the opponent's

The armed services are just beginning to think about how these new technologies of instant communication will change the battlespace, and quite frankly, there are not many good answers yet.

military is subject to a massive electronic deception operation. What is happening here?

At the strategic level, this is the paralysis of the adversary's observation, orientation, decision, action (OODA) loop.¹³ The oppo-

nent's ability to "observe" is either flooded or very slightly and subtly assaulted by contradictory information and data. More importantly, his ability to "orient" is degraded by the assault on the very possibility of objective reasoning as we replace his "known" universe with our alternative reality. His "decisions" respond increasingly to our fictive or virtual universe, and, most importantly, military "actions" within his strategic structures become increasingly paralyzed as there is no rational relationship of means to ends. What he does is not based on reality because we've changed his reality. This is real war fighting. It would seem, then, that if we can develop a strategic vision and real capability for information warfare, we can bring American strategic power within sight of that elusive "acme of skill" wherein the opponent is subdued without being killed as we destroy his ability to form or execute a coherent strategy. How, then, do we think about developing information warfare strategy?

Developing Information Warfare Strategy

Developing a strategy of information warfare starts with serious, creative, and "color-outside-the-lines" thinking about current information technologies and ways in which these might be turned to strategic purpose to serve the national command authorities and military use. This will involve thinking about information in new ways: What information is needed? What organizational changes would occur in the way we gather, process, distribute, and use information? What information-based operational changes could then happen?¹⁴ The services are starting this new thinking under the label "command and control warfare."¹⁵ This, however, is only the first step, as the "digitized battlefield" fails to revolutionize strategic thinking. Let's illustrate this with a bit of history. As Speaker of the House Newt Gingrich observed, some time

before the American Civil War, the Prussian general Helmuth von Moltke was thinking about railroads and telegraphs:

If we used the telegraph to relay mobilization orders quickly and then used railroads to concentrate troops from bases scattered throughout Prussia, we could concentrate the main effort at the key battle location of a campaign. We wouldn't have to mobilize the army, then concentrate it, then march it to where we hoped the key battle would occur.¹⁶

Good insight. And this, unfortunately, is about where we are when we think of information warfare as only command and control warfare.¹⁷ That is, how does this technology permit tanks, ships, and aircraft to do what they do now a bit better. It was Moltke's next insight, argues Speaker Gingrich, that the Joint Staff and the services need to imitate:

But the Prussian army is not organized, nor does it operate in a way that would permit it to respond to telegraphed orders to get on trains and show up somewhere else. That's not how we organize, train, and equip. What I need to do is reform the way to get the information needed to do this, the way we're organized so we can use this information, and figure-out new ways to operate; what I need is a new General Staff system.¹⁸

So Count von Moltke realized that before he could make revolutionary use of the new technology, he had to solve the higher-order question of what changes in information, organization, and operations would be needed. This is the challenge we face now. The armed forces have a good idea that information technologies just might be the driver in future warfare, but we haven't yet articulated the strategic vision or identified the higher-order changes we need to make to really make this all come together.

Now, let's add another idea—this time from the Air Force heritage. In some ways, "info-warriors" are like Gen William ("Billy") Mitchell and the pioneer league of airmen. They see the potential. Mitchell's

vision of the potential for airpower drove, at great cost to himself but great benefit to the nation, the development of a new form of warfare. Now here's the key point. Once the vision of strategic airpower was presented clearly, once people were able to say, "Yes, I see how this could change warfare,"



Prussian general Helmuth von Moltke realized that before he could make revolutionary use of railroads and telegraphs, the new technologies of his day, he had to solve the higher-order question of what changes in information, organization, and operations would be needed. This is the challenge we face now with information technologies.

then the technologies followed: "Oh, air bombing—you'll need a bombsight." "Oh, enemy aircraft—we'll need some kind of detection system; let's call it radar." This is the point—the technology is not just a force multiplier. It is the interaction of strategic vision with new technology that will pro-

duce the revolution in military affairs and a new warfare form.

This, then, is the challenge of information warfare. Is there something about information and the information technologies that would permit us to create such a mismatch between what, when, and how we and our opponents observe, orient, decide, and act or such a level of "information dominance" that the opponent is helpless—and not just on the battlefield? Is there a way we could use information, like current theories of airpower, to create an "information campaign" that engages an opponent simultaneously in time, space, and depth across the full range of his strategic structures so that the result is strategic paralysis (he is deaf, dumb, and blind to anything except that which we permit him to hear, say, or see)?¹⁹ Not that we just blind him, but that he sees what we wish him to see without realizing that it's "our" reality, not his. Can we envision that kind of strategic information warfare? And, as was the case with airpower, technology will follow strategic vision. It's OK if we can't insert computer viruses by direct satellite broadcast—today; fry every air defense radar with an electromagnetic burst from a remote unmanned aerial vehicle (UAV)—today; transfer all the dictator's Swiss bank accounts to the Internal Revenue Service (IRS)—today; project holographic images, complete with proper electronic signatures, of 15 squadrons coming in from the north when we're coming in the back door—today; or beam the Forrest Gump interview with "El Supremo" into every radio and television in banditland—today. Develop the strategic theory of information warfare, and the technology will come.

Information Warfare Doctrine

There is, of course, no official information warfare doctrine, and the efforts of the various services to describe command and



"Info-warriors" are like Billy Mitchell and the pioneer league of airmen. They see the potential. Mitchell's vision of the potential for airpower drove the development of a new form of warfare. Once the vision of strategic warfare was presented clearly, then the technologies followed. It is this interaction of strategic vision with new information technologies that will produce the revolution in military affairs and a new warfare form.

control warfare as the military application of information warfare remain incomplete. For the Air Force to focus almost exclusively on C²W that is defined as the "integration, coordination, deconfliction, and synchronization" of OPSEC, deception, PSYOP, electronic warfare, and physical destruction efforts targeted against the opponent's

fielded military forces represents a failure to appreciate either air and space power or to appreciate how airpower doctrine could guide the development of an information warfare campaign. How, then, might we use current Air Force doctrine as presented in Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force*, as a template to start thinking about information warfare?

First, assume that information warfare is warfare in the information realm as is air warfare in the air and space realms. As the objective of air warfare is to control the air realm in order to exploit it while protecting friendly forces from enemy actions in the air realm, so the objective of information warfare is to control the "infosphere" in order to exploit it while protecting friendly forces from hostile actions taken via the information realm. Thus, as air control is usually described as counterair, with offensive and defensive counterair, so any strategy and doctrine of information control must address counterinformation in terms of offensive and defensive counterinformation. Offensive counterinformation, like offensive counterair, could be seen as involving information exploitation through psychological operations, deception, electronic warfare, or physical attack and information protection as, again, physical attack, electronic warfare (EW), and, often overlooked, public and civil affairs. Defensive counterinformation, like defensive counterair, would include active protection such as physical defense, OPSEC, communications security, computer security, counterintelligence, and, again, public affairs. Passive protection would include standard ideas like hardening sites and physical security.

If control, or dominance, of the information realm is the goal, like air control, it is not an end in itself but the condition to permit the exploitation of information dominance for, as in air doctrine, strategic attack, interdiction, or close "battlefield" support through C²W attack. Information dominance of both the strategic "battle off the

battlefield" and the operational "information battlespace" is, like air and space control for traditional surface warfare, the key to strategic effect. The relevance of airpower doctrinal thinking for information warfare now becomes obvious. A review of the history of the airpower debates would show, in part, that those who insisted that airplanes were merely a force multiplier to provide close air support for the "real" effort would never recognize the strategic potential of airpower or support the acquisition of technologies for strategic air missions. As long as information warfare thinking is dominated by a doctrine that argues that the only information warfare mission relevant to the armed forces is command and control warfare and that C²W is merely a force multiplier against the communications and information assets of the fielded enemy forces, the potential for the exploitation of information dominance for strategic information warfare and, again, the identification and acquisition of key technologies will be missed. C²W, like close air support, is a vital military mission. It is, in fact, a central component of information warfare, but, like close air support and other "traditional" battle-oriented missions, not the whole story. The challenge is to use Air Force doctrine as the foundation to envision the "Information Campaign," which, like the "Air Campaign" in the Gulf War, is of strategic significance. What, for example, would "speed, precision, and lethality" be in an "info-strike?"

Epilogue: Danger of Not Developing Information Warfare Strategy

If the world really is moving into a third-wave, information-based era, failure to develop a strategy for both defensive and offensive information warfare could put the United States and the US military into the situation of being on the receiving end of an "Electronic Pearl Harbor."²⁰ Information

is fluid; the advantages we now have, and which were demonstrated in the Gulf War, could be lost because we have very little control over the diffusion of information technology.²¹ Second, it's a smaller world, and our potential opponents can observe our technologies and operational innovations and copy ours without them having to invent new ones for themselves.²² Remember, the biggest center for developing new computer software is not Silicon Valley but Madras, India. What will they sell to whom? Finally, and to return to an earlier point, if the US military approaches information warfare merely as a force multiplier and adapts bits and pieces of technology to just do our current way of warfare a bit better—if we “digitize the battlefield” for an endless rerun of mechanized desert warfare—the real danger will be that someone else will refuse to play the game our way.

Notes

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What if they, like Count von Moltke or General Mitchell, think real hard, purchase the dual-use technologies on the free world market, alter their whole strategic concept, and make the leap to a strategy of information warfare?

We do not yet have a strategy of information warfare, and we have not answered the higher-order questions of how we would reorganize, retrain, and reequip for third-wave warfare. But if any of this has made even some sense, you now know the urgent requirement for developing the vision that produces the strategy. The strategy will identify the technologies, organizational changes, and new concepts of operations. We must really become like von Moltke and Billy Mitchell—“If we could use this to do that, then we could. . . .” □

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15. Lt Col Norman B. Hutcherson, *Command and Control Warfare: Putting Another Tool in the War-fighter's Data Base* (Maxwell AFB, Ala.: Air University Press, September 1994).

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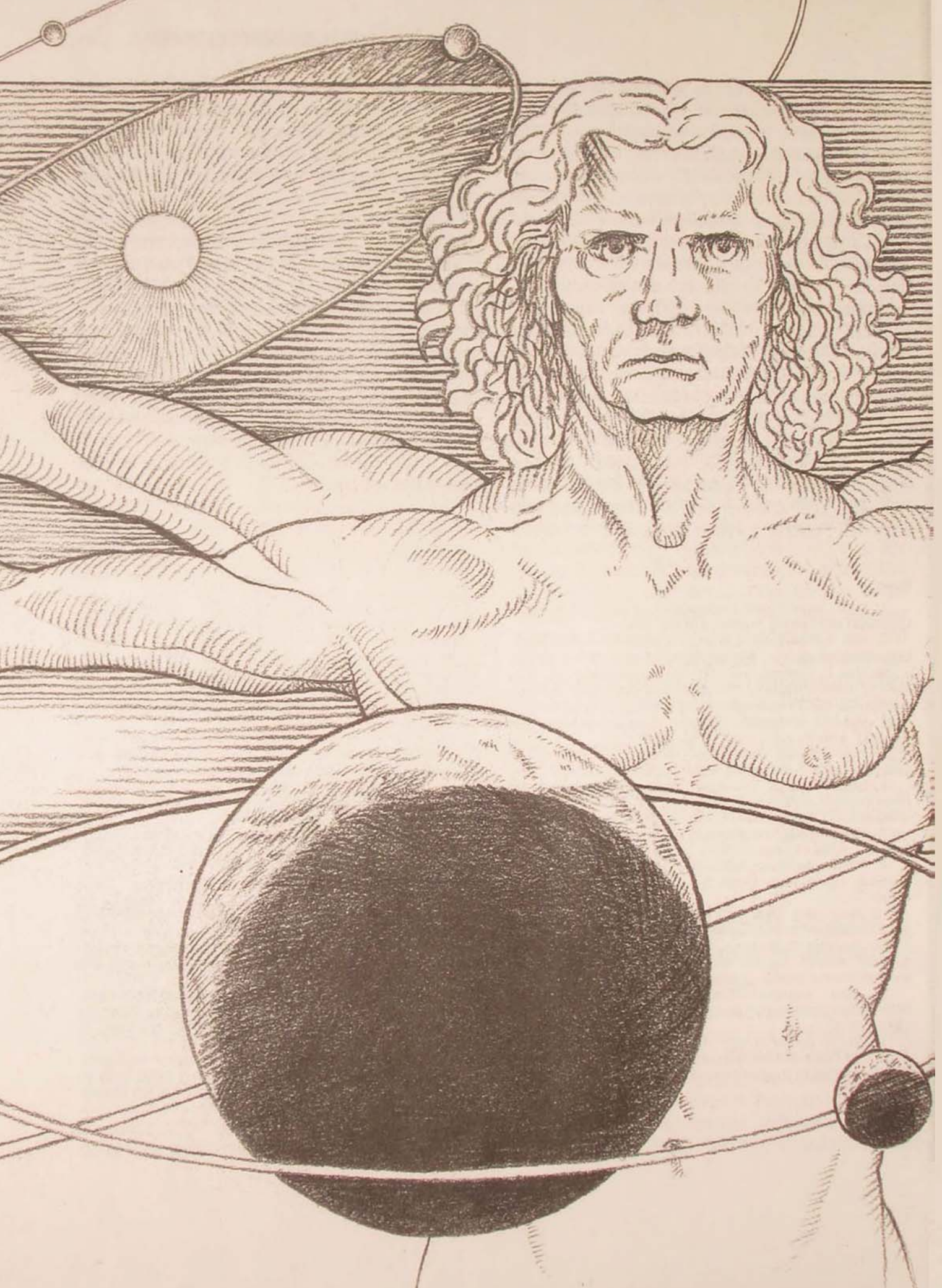
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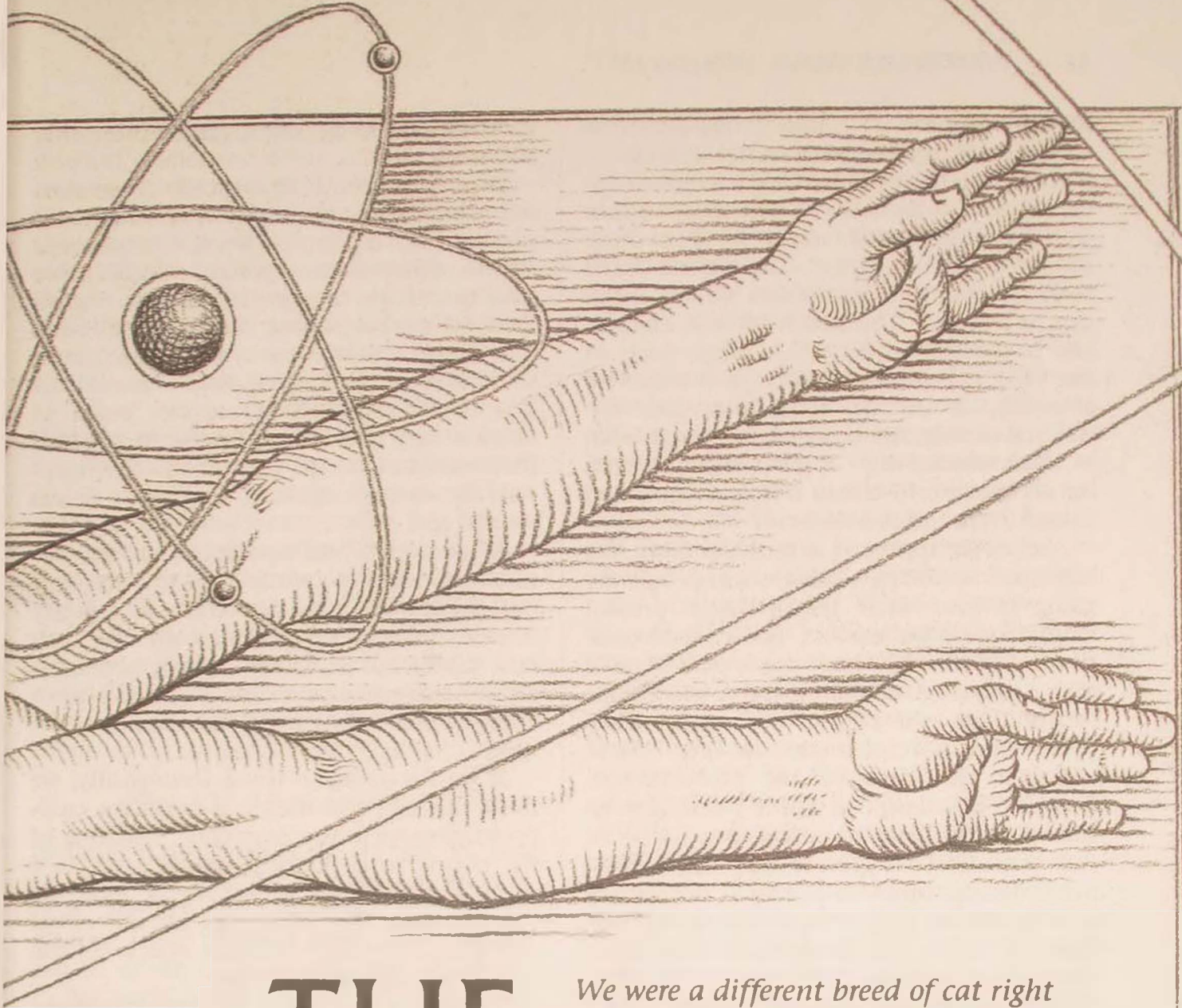
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THE ENEMY AS A SYSTEM

COL JOHN A. WARDEN III, USAF

We were a different breed of cat right from the start. We flew through the air while the others walked on the ground.

— Gen Carl A. Spaatz

SPAATZ'S DICTUM is as accurate a description of airmen today as it was over a half century ago. Slightly modified, it also applies to strategic warfare because strategic warfare is a different animal from the warfare we have known throughout history. It is not easy to understand because we need to toss out many of our ideas about war. Furthermore, prosecuting it requires top-down thinking—thinking from the big picture to the small—rather

than the bottom-up thinking that serves us so well when we deal with tactical issues.

There are basically two ways to think—inductively and deductively. The first requires gathering many small facts to see if anything can be made of them. The second starts with general principles from which detail can be learned. The first is tactical, the second is strategic. In the Air Force, most of our early training involves us with inductive processes. To become good operational artists and strategists, however, we must learn to think deductively. A good example from the civilian world comes from a comparison of architects and bricklayers.

Architects approach a problem from the top down involving a place where people are going to live. First, they envision a town with its areas for schools, houses, and businesses. When they have the overall plan in mind, they begin to think about what kinds of buildings will go into each area. They decide on a style of house that they believe will meet the needs of the probable residents. They design a house starting with general ideas of space and appearance. At the very end of the process, they may specify brick facings and how many courses of bricks will be used. Each step progresses from the large to the somewhat smaller until they finally have reached that level of detail that they can leave to someone else.

Think how bricklayers would approach the same problem. Given their training, they would start with the idea of stacking bricks, but they wouldn't have any way to know how to integrate bricks with other materials or how one house would relate to another or how the town would be divided. In other words, you can't build a very well-organized town if you approach it from the bottom up.

The same thing applies to devising a campaign. If you start your thinking based on the bricks in the enemy camp, it is unlikely that you will produce a coherent plan. Conversely, if you approach it from the standpoint of large ideas about objectives and about the nature of the enemy, you have a

good chance of developing something that will work.

We cannot think strategically if we start our thought process with individual aircraft, sorties, or weapons—or even with the enemy's entire military forces. Instead, we must focus on the totality of our enemy, then on our objectives, and next on what must happen to the enemy before our objectives become his objectives. When all of this is done rigorously, we can begin to think about how we are going to produce the desired effect on the enemy—the weapons, the delivery systems, and other means we will use.

As strategists and operational artists, we must rid ourselves of the idea that the central feature of war is the clash of military forces. In strategic war, a clash may well take place, but it is not always necessary, should normally be avoided, and is almost always a means to an end and not an end in itself.

If we are going to think strategically, we must think of the enemy as a system composed of numerous subsystems. Thinking of the enemy in terms of a system gives us a much better chance of forcing or inducing him to make our objectives his objectives and doing so with minimum effort and the maximum chance of success.

Finally, as twentieth-century strategists, we must demystify war to a considerable extent. Napoléon and Clausewitz were right when they talked about friction, fog, and morale. They were right, however, in a time when communications were almost nonexistent, weapons had little more range or accuracy than those of the Roman legions, most movement was at a walking pace, battles were won or lost depending on the outcome of tens of thousands of almost personal encounters between soldiers who could see each other when they fired, and war was largely confined to the clash of men or ships at a limited point in time and space.

Under these circumstances, morale was to the physical as three is to one. In fact, the

physical was largely the "physical" of the individual soldier and it was almost impossible to separate the intangibles like morale, friction, and fog from the physical. Today the situation is significantly different; the individual fighter has become a director of large things like tanks, aircraft, artillery pieces, and ships. Fighters are dependent on these things, these physical things, to carry out the mission. Deprived of them, the ability to affect the enemy drops to near zero. Whether the equation has changed to make the physical to be to the morale as three is to one is not clear. That the two are at least coequal, however, seems likely. The advent of airpower and accurate weapons has made it possible to destroy the physical side of the enemy. This is not to say that morale, friction, and fog have all disappeared. It is to say, however, that we can now put them in a distinct category, separate from the physical. As a consequence, we can think broadly about war in the form of an equation:

$$(\text{Physical}) \times (\text{Morale}) = \text{Outcome}$$

In today's world, strategic entities, be they an industrial state or a guerrilla organization, are heavily dependent on physical means. If the physical side of the equation can be driven close to zero, the best morale in the world is not going to produce a high number on the outcome side of the equation. Looking at this equation, we are struck by the fact that the physical side of the enemy is, in theory, perfectly knowable and predictable. Conversely, the morale side—the human side—is beyond the realm of the predictable in a particular situation because humans are so different from each other. Our war efforts, therefore, should be directed primarily at the physical side.

Objectives are key to success in strategic war. When we go to war with a state or with any strategic entity,¹ we must (or certainly should) have objectives, and these objectives, to be useful, must go far beyond those such as merely beating the enemy or wrecking his military forces. (Indeed, the latter

may be precisely what we don't want to do; remember, war at the strategic level is not the same as at the tactical level where defeat of the enemy's tactical forces is required almost by definition.) After all, we don't go to war merely to have a nice fight; rather, we go to war to attain something of political value to our organization.

The something that we want to attain may be as extreme as annihilation of the state or colonization of it. At the opposite pole, we may simply want our enemy not to annihilate us. In between is an enormous array of possibilities, a few of which follow: in the Gulf War, the US wanted Iraq out of Kuwait and wanted Iraq's power diminished to where it was no longer a threat to its neighbors; in Operation El Dorado Canyon, the US wanted Libya's Muammar Qadhafi to stop sponsoring international terrorism; in Indochina, the US wanted Vietnam to remain free of North Vietnamese and communist domination; in the American Revolutionary War, the Americans wanted to be free from Great Britain; in the War of 1898, the United States wanted to wrest Cuba and the Philippines away from Spain; and in World War II, Japan wanted to own her primary sources of raw material and energy.

At the strategic level, we attain our objectives by causing such changes to one or more parts of the enemy's physical system that the enemy decides to adopt our objectives, or we make it physically impossible for him to oppose us. The latter we call *strategic paralysis*. Which parts of the enemy system we attack (with a variety of weapons ranging from explosives to nonlethal computer viruses) will depend on what our objectives are, how much the enemy wants to resist us, how capable he is, and how much effort we are physically, morally, and politically capable of exercising.

A good place to start our examination of enemy systems is at the center. By definition, all systems have some kind of organizing center. The nucleus of an atom controls the orbits of the electrons just as the sun controls the motion of the planets. In the

Table 1
Systems

	Body	State	Drug Cartel	Electric Grid
Leadership	Brain • eyes • nerves	Government • communication • security	Leader • communication • security	Central control
Organic Essentials	Food and oxygen (conversion via vital organs)	Energy (electricity, oil, food) and money	Coca source plus conversion	Input (heat, hydro) and output (electricity)
Infra-structure	Vessels, bones, muscles	Roads, airfields, factories	Roads, airways, sea lanes	Transmission lines
Population	Cells	People	Growers, distributors, processors	Workers
Fighting Mechanism	Leukocytes	Military, police, firemen	Street soldiers	Repairmen

biological world, every organism has a directing mechanism ranging from the complex human brain to the nucleus of an amoeba. A strategic entity—a state, a business organization, a terrorist organization—has elements of both the physical and the biological, but at the center of these whole systems and of every subsystem is a human being who gives direction and meaning. The ones who provide this direction are leaders, either of the whole country or some part of it. They are the ones on which depends the functioning of every subsystem, and they are the ones who decide when they want their strategic entity to adopt—or not to adopt—a different set of objectives. They, the leaders, are at the strategic center, and in strategic warfare must be the figurative, and sometimes the literal, target of our every action.

The Five-Ring Model

To make the concept of an enemy system useful and understandable, we must make a

simplified model. We all use models daily and we all understand that they do not mirror reality. They do, however, give us a comprehensible picture of a complex phenomenon so that we can do something with it. The best models at the strategic level are those that give us the simplest possible big picture. As we need more detail, we expand portions of our model so that we can see finer and finer detail. It is important, however, that in constructing our model and using it, we always start from the big and work to the small. The model that we have found to be a good approximation of the real world is the five-ring model. It seems to describe most systems with acceptable accuracy and it is easily expandable to get finer detail as required. Thinking about something as large as a state is difficult, so let us start our examination of the five rings with something somewhat more familiar to us—our own bodies (table 1).

At the very center—the personal strategic center—is the brain. The body can exist

without a functioning brain, but under such circumstances, the body is no longer a human being, or a strategic entity. (A strategic entity is anything that can function on its own and is free and able to make decisions as to where it will go and what it will do.) The brain provides the leadership and direction to the body as a whole and to all its parts. It, and it alone, is absolutely essential in the sense that there can be no substitute for it and without it the body, even though technically alive, is no longer operating at a strategic level. Included with the brain are the preceptors that allow it to gather and disseminate information internally and externally. The eyes and other organs fall into this category.

All systems seem to require certain organic essentials—normally some form of input energy and the facilities to convert it to another form. For human beings, the essential inputs are food and oxygen. Thus, next in order of priority are those organs we call vital, like the heart, the lungs, and the liver—the ones that convert or convey food and air into something the body can use. Without these organic essentials,² the brain cannot perform its strategic function, and without the brain, these organs don't get the commands they need to provide integrated support. Note here that a machine can substitute for all the vital organs; conversely, there is no machine that can take over strategic functions from the brain.

One might ask why the vital organs would not be more important than or equal to the brain. The reason is that without the integrating, directing function of the brain, these organs are without meaning. Conversely, the brain could theoretically be kept alive and in communication with the outside world through some form of life-support systems. Under such circumstances, it would still be a "person" and would still be capable of influencing the outside world. A heart without a brain, on the other hand, is a very expensive, complex pump without meaning or ability to act or to affect.

Next in order might be the infrastructure

of bones, blood vessels, and muscles. This infrastructure is important, but there is a lot of it, and the body is capable of working around problems involving it.

Continuing our examination of the body, we might next list the tens of millions of cells that carry food and oxygen around the body. They also are important, but one can lose a fair portion and still survive.

So far, we have identified a complete system, a body that can do everything it is designed to do. In a perfect world, it would need nothing more. Unfortunately, the world is not perfect; rather, it is filled with nasty parasites and viruses that attack the body whenever they can. The body protects itself with specialized protective cells such as white blood cells. They constitute the fifth and last part of our universal system model.

As we think about human bodies, we think in terms of systems; although we can assign various levels of importance to the parts of the body, the parts really constitute a system. If any part of the system becomes incapable of functioning, it will have a more or less important effect on the rest of the body. Interestingly, each part of the body is in turn a system. The heart, as an example, has an internal control mechanism, uses incoming energy, has an internal network of vessels, has millions of cells to do necessary work, and has its own specialized protective cells. So we have a strategic entity or system—the body—which in turn is composed of many subsystems, each one of which tends to mirror the whole entity in terms of the way it is organized.

At the other end of the spectrum is the solar system. The sun is analogous to the brain. It is located in the center and its gravity keeps the planets in orderly orbit. Its organic essential is the fusion process that gives heat to the whole solar system and that maintains the sun at the appropriate size and mass. It sends its heat and gravity through the infrastructure of space itself and the planetary orbits. The planets themselves are analogous to the cells in a body or the peo-

ple in a state. The only thing the system lacks is the fifth component that protects the system from outside attack. Inorganic systems, unlike organic ones, have no self-protection capability.

If some group wanted to destroy the solar system, it could do so by attacking and destroying each planet—or, it could simply destroy the sun (or perhaps merely put a gravity shield around it if it wanted the sun for some other purpose). With the sun gone, or its gravity blocked, all the planets would fly off into outer space and the solar system would be history. It is useful to note that the effect on earth of the sun's destruction would not be evident for about nine minutes and that some life on earth would continue for some period of time thereafter. (One must always assume a delay between strategic events and subsequent tactical effect.) The earth, however, would be irrelevant if the sun, its strategic center—its "brain" were to disappear.

Between the human body and the solar system in size and complexity are such human artifacts as a large electrical grid. An electrical grid consists of a central controller, has organic essentials of energy input and conversion to create electricity, has an infrastructure of transmission lines, is populated by people who keep it functioning, and has repairmen to fix it when something breaks.

Having looked at different systems with which we have some familiarity, we recognize a similarity that carries across all of them. The model that unfolds before us and that seems to describe a reasonable number of different systems has four basic components: central leadership or direction, organic essentials, infrastructure, and population. In addition, all organic systems seem to have a fifth component that protects the system from outside attack or general degradation. In other words, we have a simple model that serves as a road map to help us understand very complex processes.

If we were to start from the bottom up to understand something like an electrical system, we would have to become experts in

electricity, computers, mechanics, materials, and many other subjects. Unless that was to be our lifework, we would probably never get to the point where we really understood how everything comes together. And electrical systems are only one of a near infinite number of systems that are of interest to the strategic thinker and war planner. Since we can't possibly learn any of these systems in detail, we must present them in ways that allow us to gain sufficient understanding so that we can deal with them in the real world—and deal with them we must because they are our essence and the essence of our enemies.

The model built, we can look for additional similarities that apply to systems in general. One of great significance is the apparent applicability of the second law of thermodynamics. This natural law tells us that the inexorable movement of everything is from a state of order to a state of disorder. Our homes are good examples of the second law in action.³ We all know that it takes great energy to make our homes orderly—and even more to slow the process of disordering. We know that our homes are in a constant state of deterioration, from the tendency of clothes and books to "migrate" from closets and shelves and clutter the house, to the calcification of the plumbing, to the chipping of the paint. The more complex a system, the more precarious its maintenance tends to be and the more likely that injections of energy in the wrong places will speed its natural movement toward disorder—and perhaps even to chaos.

Figure 1 presents the five rings in their simplest graphical form. Figure 2 is very similar, except it shows a variety of subsystems in orbit about the center. It may be helpful to some to think of these orbiting subsystems as electrons; if the electrons move into a different orbit or disappear completely, the atom changes its nature. Finally, figure 3 is another variation, but this time the circles have become ellipses. This variation helps to show that the model is depicting a dynamic system and that all sys-

tems are not going to have precisely the same relationship among the five rings. The five rings provide a model for systems at a macro level. They also describe centers of gravity for a strategic entity.

Let us now see how our models apply to a strategic entity like a state or a drug cartel and how we can use them to develop campaign plans. Before proceeding, however, it is imperative to understand that strategic war may have nothing to do with the enemy's military forces.

Strategic war is war to force the enemy

state or organization to do what you want it to do. In the extreme, it may even be war to destroy the state or organization. It is, however, the *whole system* that is our target, not its military forces. If we address the system properly, its military forces will be left as a useless appendage, no longer supported by its leadership, organic essentials, infrastructure, or population. This is not to say that we do not have to think about how to defeat an enemy military force directly. Indeed, there will be times when its defeat is the only way to get to the strategic centers it

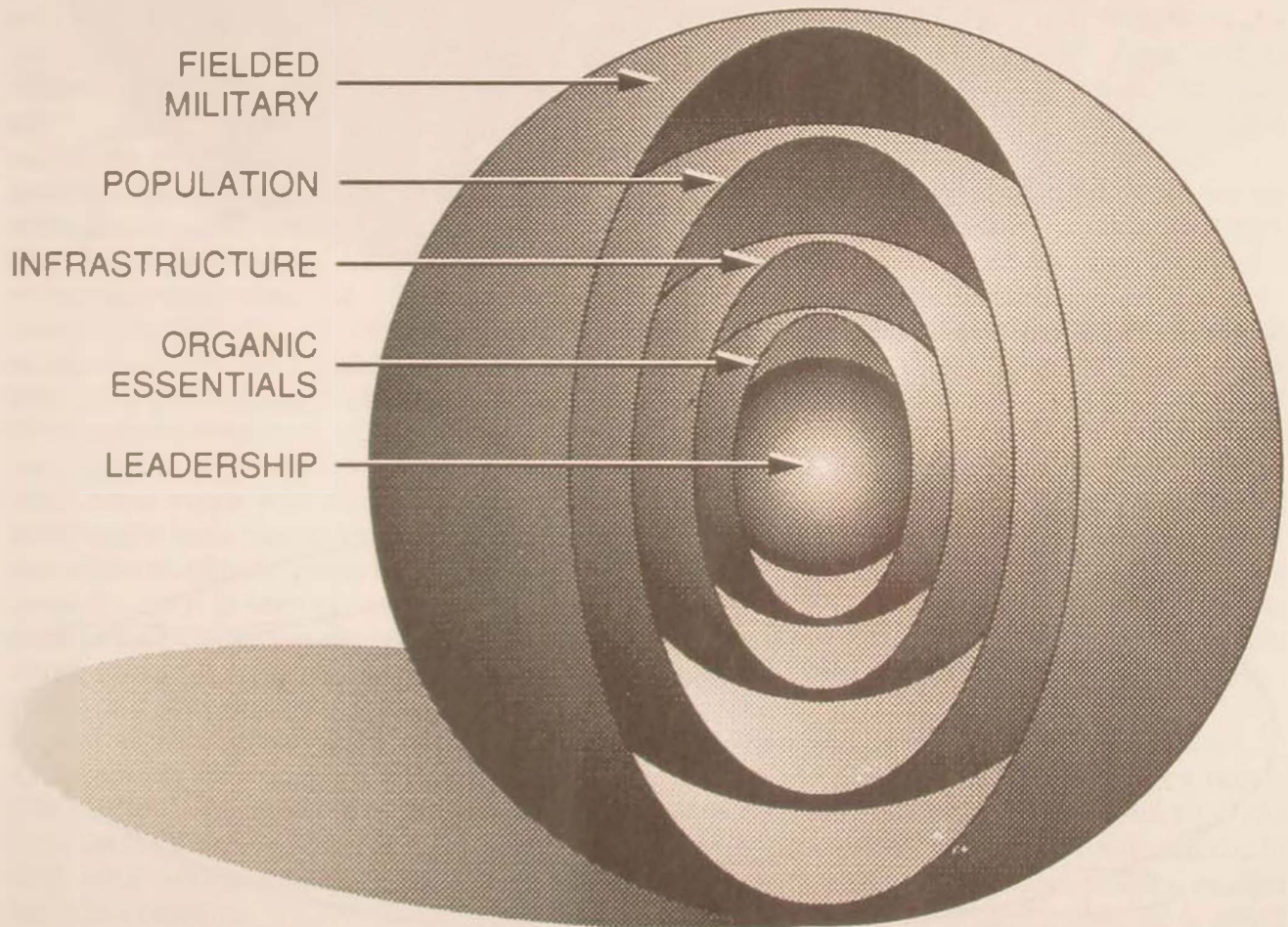


Figure 1. The Basic Five-Ring Model

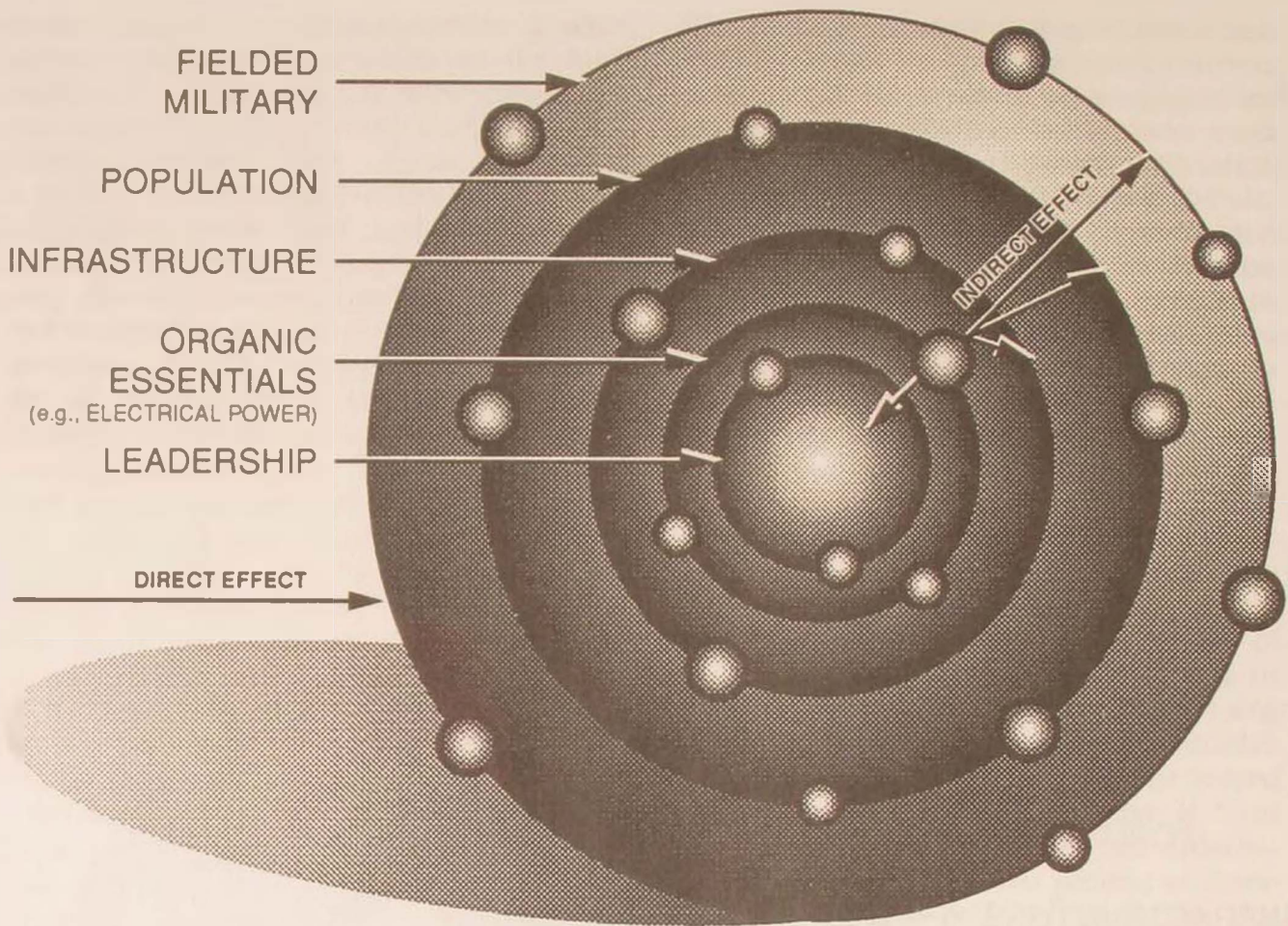


Figure 2. The Five-Ring Model with Subsystems

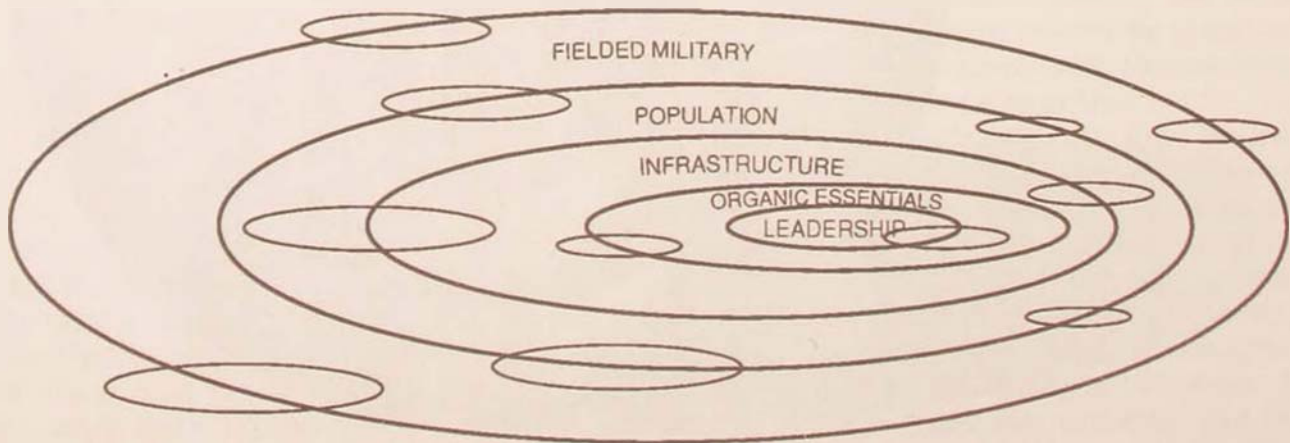


Figure 3. The Five Rings as Ellipses

guards; at other times, we may not have the wherewithal to attack the enemy's strategic centers. In these cases, however, we must still understand that even the enemy military is a system that is well described by the five-ring model. Key to our success is keeping in mind that strategists and operational artists start with the large entity, the enemy system, then work their way down to the small details as required.

Using the Five Rings for Strategic Warfare

The concept of centers of gravity is simple in concept but difficult in execution because of the likelihood that more than one center will exist at any time and that each center will have an effect of some kind on the others. It is also important to note that centers of gravity may in some cases be only indirectly related to the enemy's ability to conduct actual military operations. As an example, a strategic center of gravity for most states beyond the agrarian stage is the power-generation system. Without electric power, production of civil and military goods, distribution of food and other essentials, civil and military communication, and life in general become difficult to impossible. Unless the stakes in the war are very high, most states will make desired concessions when their power-generation system is put under sufficient pressure or actually destroyed. Even if they do not sue for peace, their loss of electric power will have a devastating effect on their strategic base, which in turn will make prosecution and support of the war extraordinarily difficult—especially if the power system is shut down quickly, in days rather than in months or years. Note that destruction of the power system may have little short-term effect at the front—if there is a front.

Every state and every military organization will have a unique set of centers of gravity—or vulnerabilities. Nevertheless, our

five-ring model gives us a good starting point. It tells us what detailed questions to ask, and it suggests a priority for the questions and for operations—from the most vital at the middle to the least vital at the outside. These centers of gravity, which are also rings of vulnerability, are absolutely critical to the functioning of a state.

The most critical ring is the command ring because it is the enemy command structure, be it a civilian at the seat of government or a military commander directing a fleet, which is the only element of the enemy that can make concessions, that can make the very complex decisions that are necessary to keep a country on a particular course, or that can direct a country at war. In fact, wars through history have been fought to change (or change the mind of) the command structure—to overthrow the prince literally or figuratively—or, put in other words, to induce the command structure to make concessions or to make it incapable of leading.

Capturing or killing the state's leader has frequently been decisive. In modern times, however, it has become more difficult—but not impossible—to capture or kill the command element. At the same time, command communications have become more important than ever, and these are vulnerable to attack. When command communications suffer extreme damage, as they did in Iraq, the leadership has great difficulty in directing war efforts; in the case of an unpopular regime, the lack of communications not only makes it difficult to keep national morale at a sufficiently high level but also facilitates rebellion on the part of dissident elements.

When the command element cannot be threatened directly, the task becomes one of applying sufficient indirect pressure so that the command element rationally concludes that concessions are appropriate, realizes that further action is impossible, or is physically deprived of the ability to continue a particular course or to continue combat. The command element will normally reach

these conclusions as a result of the degree of damage imposed on the surrounding rings. Absent a rational response by the enemy command element, it is possible to render the enemy impotent—to impose strategic paralysis—by destroying one or more of the outer strategic rings or centers of gravity.

The next most critical ring contains the organic essentials. Organic essentials are those facilities or processes without which the state or organization cannot maintain itself. It is not necessarily directly related to combat; indeed, war-related industry may not be very important qua war industry in many cases. As an example, consider the effect on a drug cartel if its drug production comes to a halt. Just as nothing happens instantly to the earth if the sun disappears, the drug cartel will not instantly go up in smoke. It is quite clear, however, that the system must either change dramatically or perish.

On a state level, the growth in the size of cities around the world and the necessity for electricity and petroleum products to keep a city functioning have put these two commodities in the essential class for most states. If a state's organic essentials—whether generated internally or imported—are destroyed, life itself becomes difficult and the state becomes incapable of employing modern weapons and must make major concessions, which could be as little as forswearing offensive operations outside its own borders. Depending on the size of the state and the importance it attaches to its objectives, even minor damage to essential industries may lead the command element to make concessions. The concessions may come because

- a. damage to organic essentials leads to the collapse of the system.
- b. damage to organic essentials makes it physically difficult or impossible to maintain a certain policy or to fight.
- c. damage to organic essentials has internal political or economic repercussions that are too costly to bear.

The number of organic-essential targets in even a large state is reasonably small and each of the targets in subsystems such as power production and petroleum refining is fragile.⁴

The third most critical ring is the infrastructure ring. It contains the enemy state's transportation system—the system that moves civil and military goods and services around the state's entire area of operations. It includes rail lines, airlines, highways, bridges, airfields, ports, and a number of other similar systems. It contains the majority of a state's industry because most of its industry does not fall in the organic-essential category. For both military and civil purposes, it is necessary to move goods, services, and information from one point to another. If this movement becomes impossible, the state system quickly moves to a lower energy level, and thus to a lesser ability to resist the demands of its enemy. Compared to organic-essential systems, there are more infrastructure facilities and more redundancy; thus, a greater effort may be required to do enough damage to have an effect.

The fourth most critical ring is the population. Moral objections aside, it is difficult to attack the population directly. There are too many targets, and, in many cases, especially in a police state, the population may be willing to suffer grievously before it will turn on its own government. Indirect attack on the population, such as North Vietnam used against the United States, may be especially effective if the target country has a relatively low interest in the outcome of the war. As the North Vietnamese showed, it is entirely possible to create conditions that lead the civilian population of the enemy to call on its government to change the state's policies. The North Vietnamese accomplished their aims by raising American military casualty levels higher than the American people would tolerate. Almost certainly there are actions that can be taken to induce any enemy civilian population to offer some degree of resistance to its govern-

ment's policies. It is tough to determine what those actions might be because humans are so unpredictable. As part of an overall effort to alter the enemy system, an indirect approach to the population is probably worthwhile; one should not, however, count on it.

Early air theorists such as Giulio Douhet thought that wars could be won by inflicting such casualties on the civilian population that morale would break with subsequent capitulation. Historically, of course, he was on solid ground; besieged cities have normally surrendered when the pain and suffering became too much for the civilians to bear. Many have argued, however, that the bombing of Britain and Germany in World War II actually stiffened civilian morale. While there is certainly no evidence to support such an improbable claim, the evidence is quite clear that neither British nor German civilian morale fell to the point where the respective governments were forced to surrender.

That morale did not collapse in Britain and Germany is no proof that a different approach wouldn't lead to different results in different places and times. As an example, Iraqi terror attacks on Iran certainly affected civilian morale and almost certainly led the Iranian government to agree to an armistice with Iraq. Again, let us reiterate that we hold direct attacks on civilians to be morally reprehensible and militarily difficult. That, however, will not keep someone else from trying it against us or one of our friends. It is something that has existed since time immemorial and isn't likely to go away in the near future.

The last ring holds the fielded military forces of the state. Although we tend to think of military forces as being the most vital in war, in fact they are means to an end. That is, their only function is to protect their own inner rings or to threaten those of an enemy. A state can certainly be led to make concessions by reducing its fielded military forces—and if all of its fielded forces are destroyed, it may have to make the ulti-

mate concession simply because the command element knows that its inner rings have become defenseless and liable to destruction.

Viewing fielded forces as means to an end and not necessarily important in themselves is not a classical view—in large part because the majority of the classical writing and thinking on warfare has been done by continental soldiers who had no choice but to contend with enemy armies. Modern technology now, however, makes possible new and politically powerful options that in fact can put fielded forces into the category of means and not ends.

In most cases, all the rings exist in the order presented, but it may not be possible to reach more than one or two of the outer ones with military means. By the end of 1943, for example, the Germans in World War II were incapable of making serious attack on anything but the fourth and fifth rings (population and fielded forces) of their primary enemies; they did not have a useful long-range attack capability. The Japanese could attack only the fifth ring (fielded forces) of their primary enemies. Conversely, the United States and the Allies could attack every German and Japanese ring of vulnerability. The Iraqis in the 1991 Gulf War had an even more difficult problem: they could not reach any of their principal foe's strategic rings unless the United States chose to put its fielded forces in harm's way. For such states that cannot employ military weapons against their enemy's strategic centers, the only recourse is indirect attack through psychological or unconventional warfare.

It is imperative to remember that all actions are aimed against the mind of the enemy command or against the enemy system as a whole. Thus, an attack against industry or infrastructure is not primarily conducted because of the effect it might or might not have on fielded forces. Rather, it is undertaken for its direct effect on the enemy system, including its effect on national leaders and commanders who must assess the cost

of rebuilding, the effect on the state's economic position in the postwar period, the internal political effect on their own survival, and whether the cost is worth the potential gain from continuing the war. The essence of war is applying pressure against the enemy's innermost strategic ring—its command structure. Military forces are a means to an end. It is pointless to deal with enemy military forces if they can be bypassed by strategy or technology either in the defense or offense.

One additional point needs to be made about the five rings. They are in the order presented for several reasons: the most important is in the middle (World War II Germany continued to resist, however ineffectually, until Hitler died); there is an increase in numbers of people or facilities moving from the center to the fourth ring (one or two leaders, a few dozen organic essentials, many infrastructure facilities, and a large number of people); and the theoretical vulnerabilities decrease from the inside to the outside—largely due to numbers involved. The fifth ring is actually smaller in number than the fourth ring of population, but it is theoretically less vulnerable to direct attack simply because it is designed to be so. A relative handful of bombs around Qadhafi drove him to make concessions; that same number falling on his tanks would have been inconsequential.

Although we discussed earlier the idea that strategic war is different from our popular view of war, it is such a difficult concept to grasp that it bears another discussion. We can take ourselves back to a mythical, but logically plausible, early world where all men lived in peace. That is, they lived in peace until one group decided it wanted something that a neighboring community had and was going to take it. That something, of course, by definition lay within the four innermost rings; perhaps it was food, perhaps it was some part of the infrastructure, or perhaps it was the people themselves.

That first war was certainly successful be-

cause there was no fifth ring to defend the inner four. (Despite the lack of armed forces clashing, it was every bit as much a war as any that took place subsequently.) The attacked community, however, quickly remedied the situation and created a force, a fifth ring, to defend the inner four. Our point is simple: strategic war came first, and it was only after the widespread creation of fifth-ring military forces that we began to think about war as the clash of those forces. Logic, of course, says that the purpose of war, if it is to be anything more than a sideshow, is to do something to the enemy's inner rings or to prevent him from doing something to yours. If this is the case, then clearly our planning should be based on affecting or defending inner rings at the earliest and least costly opportunity. We should only deign to do classical battle if we have no choice.

Before continuing, we must ask ourselves if there exist states or organizations that do not have all five rings or centers of gravity. Our basic answer is no, simply because our five rings are merely a model of the real world of systems built around life-forms of any type. On the other hand, the relative importance of the outer four rings (the leadership ring is by necessity always of paramount importance) has changed over time. In addition, vulnerabilities of the rings clearly change from one societal system and one historical period to another.

As an example, when William the Conqueror developed his campaign plan for the conquest of England, he would not have identified organic essentials, infrastructure, or the population as centers of gravity against which he could hope to operate with decisive results. His target had to be the center ring—King Harold himself. He had neither the time nor the resources to deal with population, infrastructure, or organic essentials. Consequently, he aimed directly for Harold, who was protected by his fifth-ring army. (At that time in history, the leader and the army were frequently one and the same.) When Harold fell to a high-

trajectory arrow, William had accomplished his strategic objective. Today, the problem is more difficult because it is rarely possible to operate directly and successfully against a single organization leader. Therefore, it will normally be necessary to strike at several of the inner rings.

The utility of the five-ring model may be somewhat diminished in circumstances where an entire people rises up to conduct a defensive battle against an invader. If the people are sufficiently motivated, they may be able to fight for an extended period by using the resources naturally available to them. This occasionally happens when the invader is so terrible that people see no hope if they surrender. When people do fight to the last, they are fighting as individuals and in essence each person becomes a strategic entity unto himself. While such may be possible for the defense, it is not for the offense. It is a special case, and one definitely not to be confused with Maoist ideas on guerrilla warfare in which the guerrilla organization is well described by the five rings.

To this point, we have discussed centers of gravity that are strategic because they are principal parts of the enemy system. Ideally, a commander will attack centers of gravity as close as possible to the leadership ring of the five rings. He may, however, be forced to deal with the enemy's fielded military forces because he cannot reach strategic centers without first removing enemy defenses because enemy forces are threatening his own strategic or operational centers of gravity or because his political masters will not permit him to attack strategic centers. In these cases, he must view his enemy military forces as systems and go through the same analysis that he did when he was dealing with the enemy as a whole. What does one do when it is necessary to deal with the enemy's military forces for whatever reason?

Centers of gravity exist not only at the strategic level but also at the operational level—and, indeed, are very similar. At the operational level, the goal is still to induce the enemy operational-level commander to

make concessions such as retreating, surrendering, or giving up an offense. Like the state command structure, however, the operational commander has rings of vulnerability—or centers of gravity—surrounding him. In fact, each major element of his command will also have similar centers of gravity.

At the operational level, the first ring or center of gravity is the commander himself. He is the target of operations either directly or indirectly because he is the one who will decide to concede something to the enemy. Included in his center ring is his central command, control, and communications system; without the ability to collect information and issue orders to his subordinates, the commander—and his command—are in peril. As at the strategic level, however, the likelihood of physically seizing or paralyzing the command ring is relatively small; thus, recourse to the operational rings, or centers of gravity, surrounding the operational-level commander may be necessary.

The next operational ring is the organic-essentials ring (which at the operational level may be thought of as logistics) because it contains the essentials of combat—the ammunition, the fuel, and the food without which modern war cannot be prosecuted. A cursory review of history quickly reveals the dire straits that operational-level commanders have encountered when their logistics ring suffered from enemy attack. Indeed, war in the seventeenth and eighteenth centuries was in large measure designed around isolating a commander from his logistics ring. Experience on both sides in the Gulf War, as well as in the study of operational-level petroleum, oil, and lubricants (POL) distribution in the Soviet army, shows that the problem of providing key logistics support for a large-scale offensive has become incredibly more difficult than ever in the annals of warfare. The difficulty and complexity, however, make attack of this center of gravity easier and more decisive than even in World War II, where much equipment was still moved by horse-drawn vehicles⁵ and

where total requirements per man in the field were a fraction of what they are today.

An infrastructure is necessary to move the materiel found in the organic-essentials ring as well as fielded military forces themselves—and this infrastructure is the third operational ring. It consists of roads, airways, seaways, rails, communications lines, pipelines, and a myriad of other facilities needed to employ fielded forces.

None of the three inner rings will function without personnel to staff them, and these support personnel constitute the fourth operational ring. Like the population in the fourth strategic ring, however, these personnel present difficult targets and will rarely be appropriate for direct attack.

The fifth and last ring of the operational commander is his fielded forces—his aircraft, his ships, and his troops. The fifth ring is the toughest to reduce, simply because it is designed to be tough. As a general rule, a campaign that focuses on the fifth ring (either by choice or because no alternatives exist) is likely to be the longest and bloodiest for both sides. Nevertheless, it is sometimes appropriate to concentrate against the fifth ring, and sometimes it may be necessary to reduce the fifth ring to some extent in order to reach inner operational or strategic rings.

Parallel Attack

The most important requirement of strategic attack is understanding the enemy system. The system understood, the next problem becomes one of how to reduce it to the desired level or to paralyze it if required. Parallel attack will normally be the preferred approach, unless there is some cogent reason to prolong the war.

States have a small number of vital targets at the strategic level—in the neighborhood of a few hundred with an average of perhaps 10 aimpoints per vital target. These targets tend to be small, very expensive, have few

backups, and are hard to repair. If a significant percentage is struck in parallel, the damage becomes insuperable. Contrast parallel attack with serial attack in which only one or two targets come under attack in a given day (or longer). The enemy can alleviate the effects of serial attack by dispersal over time, by increasing the defenses of targets that are likely to be attacked, by concentrating his resources to repair damage to single targets, and by conducting counteroffensives. Parallel attack deprives him of the ability to respond effectively, and the greater the percentage of targets hit in a single blow, the more nearly impossible his response.

Parallel attack has not been possible on any appreciable scale in the past because a commander had to concentrate his forces in order to prevail against a single vulnerable part of the enemy's forces. If he prevailed, he could reconcentrate and move on to attack another point in the enemy's defenses. The process of concentrating and reconcentrating was normally lengthy and one that the enemy worked hard to foil. This process, better understood when labeled "serial warfare," permitted maneuver and counter-maneuver, attack and counterattack, and movement and pause. It also gave rise to the phenomenon known as the *culminating point* in campaigns—that point at which the campaign is in near equilibrium where the right effort on either side can have significant effect. All of our thinking on war is based on serial effects, on ebb and flow. The capability to execute parallel war, however, makes that thinking obsolete.

Technology has made possible the near simultaneous attack on every strategic- and operational-level vulnerability of the enemy. This parallel process of war, as opposed to the old serial form, makes very real what Clausewitz called the ideal form of war, the striking of blows everywhere at the same time. For Clausewitz, the ideal was a Platonic shadow on the back of the cave wall, never to be known by mortals. The shadow has materialized and nothing will be the same again.

Conclusion

Strategic warfare provides the most positive resolution of conflicts. To execute it well, however, we must reverse our normal method of thinking; we must think from the big to the small, from the top down. We must think in terms of systems; we and our enemies are systems and subsystems with mutual dependencies. Our objective will almost always involve doing something to reduce the effectiveness of the overall system, if you will, to make it more susceptible to the infectious ideas we want to become part of it. At the same time, we must take neces-

sary action to ensure that the enemy does not do unacceptable damage to our system or any of its subsystems.

We must not start our thinking on war with the tools of war—with the airplanes, tanks, ships, and those who crew them. These tools are important and have their place, but they cannot be our starting point, nor can we allow ourselves to see them as the essence of war. Fighting is not the essence of war, nor even a desirable part of it. The real essence is doing what is necessary to make the enemy accept our objectives as his objectives. □

Notes

1. Strategic entities are really our subject matter with a nation-state being a type of strategic entity. A *strategic entity* is any organization that can operate autonomously; that is, it is self-directing and self-sustaining. A state is a strategic entity as is a criminal organization like the Mafia or business organizations like General Motors. Conversely, neither an army nor an air force is a strategic entity because they are neither self-sustaining nor self-directing. This is an important distinction in itself. Of most importance here, however, is that our discussion of strategic centers and strategic warfare is as applicable to a guerrilla organization as to a modern industrial state.

2. Those familiar with the five-ring model used to develop the initial Gulf War air campaign plan will recognize a name change at this point from key production to “organic essentials.” It has always been clear that there were certain facilities or processes so important to a state that they required a specific label and class. Thus, we identified the production of electricity and petroleum products as “key production” because we believed that taking them away from a state which had them would transform the state into something quite different and far less powerful. Many people, however, had difficulty distinguishing between key production, normal production, and infrastructure. I believe the name change to *organic essentials* (meaning they are part and parcel of the system and essential to its survival in its current state) should help clear up

this problem. In addition, as the similarity between many different types of systems becomes clearer, organic essentials seem to have more universal applicability.

3. With thanks to Stephen Hawking and his book *A Brief History of Time: From the Big Bang to Black Holes* (New York: Bantam Books, 1988).

4. Superficially, Allied attacks on German industry in World War II would seem to contradict the idea that essential industry is fragile. In that conflict, however, bombing accuracy was not good; more than half of all bombs dropped missed their targets by well over a thousand yards. When accuracies are improved to where more than half of all bombs fall within a few feet of their target, as did the majority of those aimed at petroleum and electric targets in Iraq, it becomes clear that what took thousands of sorties and many tons of bombs can now be accomplished with orders-of-magnitude less effort.

5. Well over a third of German transport used on the offensive against the Soviets in 1941 was horse-drawn. Likewise, the supplies needed to keep Patton’s entire Third Army on the offensive in 1944 would barely support a single corps today. The proliferation of motor vehicles, communications equipment, and doctrine demanding high rates of fire has perhaps created more problems than it has solved for an offensive army.



A THEORY OF INFORMATION WARFARE

Preparing for 2020

COL RICHARD SZAFRANSKI, USAF

THE PROFESSION of arms in a democracy is not exempt from oversight or from consideration of just conduct, even in warfare. Where the will of the people, the moral high ground, and the technological high ground are the same, the profession will remain a useful and lofty one. If, however, the moral high ground is lost, a domino effect occurs: public support is lost, the technological high ground is lost, and the armed forces are lost. It is within this framework that this article postulates a theory of information warfare¹ within the larger context of warfare and proposes ways to wage information warfare at

the strategic and operational levels. The tools to wage information warfare are at hand, and because information weapons are such powerful weapons, both combatants and noncombatants need to be protected against them. The vulnerability to information warfare is universal. The decisions to pursue the development of information weapons or to prosecute information warfare are governmental decisions. These decisions need to be made consciously and deliberately and with an understanding of the moral and ethical risks of information warfare. After assessing all the risks and deciding to create information weapons or engage

in information warfare, the decision makers should first have an understanding of these weapons and a weapon employment theory before such warfare starts rather than after the weapons are deployed or have already been employed.

Information

Information as used here means the "content or meaning of a message."² An aim of warfare always has been to affect the enemy's information systems. In the broadest sense, information systems encompass every means by which an adversary arrives at knowledge or beliefs. A narrower view maintains that information systems are the means by which an adversary exercises control over, and direction of, fielded forces. Taken together, information systems are a comprehensive set of the knowledge, beliefs, and the decision-making processes and systems of the adversary. The outcome sought by information attacks at every level is for the enemy to receive sufficient messages that convince him to stop fighting.

Why would an adversary stop fighting? There are a number of possibilities: an inability to control fielded forces, demoralization, the knowledge or belief that combat power has been annihilated, or an awareness that the prospects of not fighting are superior to the prospects of continuing the fight. These "stop-fighting" messages might be as varied in content or meaning as "Cannae has ruined you," or "Submit to the Tartar or die," or "Your counterattack has failed," or even "Your own people do not support you in warfare that kills babies." Although the methods of communicating the stop-fighting message have changed over the years, the meaning of the message itself remains fairly constant: stop fighting.

As social institutions evolved from first-wave agrarian societies to second-wave industrial states, information systems evolved and decision-making processes became more complex. Mercantile organizations arose

within or alongside the dominant political structures, adding elements of greater complexity as the scope of their activities enlarged. Knowledge networks of knowledge workers, the newest form of institutional structure, emerged and their numbers increased in tandem with the availability of the tools of information technology. As information technology advanced, information systems allowed knowledge, or know-how, to make all the other institutional forms more effective.³

As societal institutions evolved, the ways in which societies fought evolved also. The terrorizing drums, banners, and gongs of Sun Tzu's warfare, aided by information technology, became the sophisticated psychological operations of modern warfare. The aim of warfare moved from, or could move from, exhaustion to annihilation to control, according to John Arquilla and David Ronfeldt.⁴ Information technology may now have evolved to the point where "control" can be imposed with little physical violence or bloodshed. On the surface this appears to be a good thing. At its center, it may be a dangerous thing. Closer scrutiny should reveal which of these is the case.

What Warfare Is

Warfare is the set of all lethal and non-lethal activities undertaken to subdue the hostile will of an adversary or enemy. In this sense, warfare is not synonymous with "war."⁵ Warfare does not require a declaration of war, nor does it require existence of a condition widely recognized as "a state of war." Warfare can be undertaken by or against state-controlled, state-sponsored, or nonstate groups. Warfare is hostile activity directed against an adversary or enemy. The aim of warfare is not necessarily to kill the enemy. The aim of warfare is to merely subdue the enemy. In fact, the "acme of skill" is to subdue an adversary without killing him.⁶ The adversary is subdued when he behaves in ways that are coincident with the ways in

which we—the aggressor or the defender—intend for him to behave.⁷ In aiming to subdue hostile will, we must have a clear understanding of the specific nonhostile behaviors we intend to compel, or the hostile ones we want to prevent.

When the security forces of a state engage an enemy state in warfare, the government determines the specific nonhostile behaviors sought from the adversary. When other groups—guerrillas, gangs, clans—engage in warfare, the group leader decides the specific nonhostile behaviors sought. In both state and nonstate warfare forms, the decisions made by group leaders define the aims, the methods, and the desired postconflict conditions of the warfare. Even so, it is a fiction, albeit a common and convenient one, to assert that “states” or “groups” wage warfare. The decision to engage in warfare, including the decision to terminate warfare, is made by *leaders* in the state or group. Likewise, it is the hostile will of enemy leaders that must be subdued to be successful in warfare.⁸ Group members, or the citizens of states, may influence the leaders’ decisions, but it is the hostile will of leadership that must be subdued. If the “mandate of heaven” passes from the leader to other group members—successor leaders or the population at large—the hostile will of these new leaders must be subdued. Information warfare can help withdraw the mandate of heaven from the hands of adversary leaders.

The great discovery that launched the information-age was awareness that everything in the external world could be reduced to combinations of zeroes and ones. These combinations could be transmitted electronically as data and recombined upon receipt to form the basis of information. According to the seminal work on control warfare by Arquilla and Ronfeldt, information is more than the content or meaning of a message. Rather, information is “any difference that makes a difference.”⁹ Information warfare is a form of conflict that attacks information systems directly as a means to attack adversary knowledge or beliefs. Infor-

mation warfare can be prosecuted as a component of a larger and more comprehensive set of hostile activities—a netwar or cyberwar—or it can be undertaken as the sole form of hostile activity.¹⁰ Most *weapons*—a word used to describe the lethal and nonlethal tools of warfare—only have high utility against external adversaries. While most often employed against external adversaries, many of the weapons of information warfare are equally well suited for employment against internal constituencies. For example, a state or group would not normally use guns and bombs against its own members; however, the weapons of information warfare can be used, have been used, and very likely will be used against both external and internal adversaries. Information warfare in the Third Reich, for example, was omnifrontal.

Information warfare is hostile activity directed against any part of the knowledge and belief systems of an adversary. The “adversary” is anyone uncooperative with the aims of the leader. Externally, this is the agreed-upon “enemy,” or the “not us.” Internally, the adversary might be the traitor, the faint of heart, or the fellow traveler—anyone who opposes or is insufficiently cooperative with the leader who controls the means of information warfare. If the internal members of a group are insufficiently supportive of the aims of the leader during warfare, internal information warfare (including such things as propaganda, deception, character assassination, rumors, and lies) can be used in attempts to make them more supportive of the aims of leadership.

Warfare and Its Relation to What We Know or Believe

Whether directly employed against an external adversary or internal constituencies, information warfare has the ultimate aim of using information weapons to affect (influence, manipulate, attack) the knowledge and belief systems of some external adversary. It

is useful in warfare, for example, for an external adversary to know, or at least believe, that the opposing state or group is united against him or her. Information warfare, simultaneously employed to make internal constituencies cooperative and external adversaries believe its enemy is a united front, is used to help seat that awareness in the knowledge and beliefs residing in the mind of adversary leadership.

The Fragility of Knowledge and Beliefs

Knowledge systems are those systems organized and operated to sense or observe verifiable phenomenological indicators or designators, translate these indicators into perceived realities, and use these perceptions to make decisions and direct actions.¹¹ Sensing that the plate is hot, one releases it. Observing that one's expenditures exceed income, one curbs spending. Our sensing and observing systems allow us to *know*. We decide and act based on our knowledge, but not on knowledge alone. Knowledge systems are organized according to scientific principles and sustained by the scientific method. That is, knowledge systems are organized to collect empirical data by sensing or observation to formulate hypotheses, to conduct tests that validate or invalidate the hypotheses, and to use these findings as the basis for further action. Belief systems are those implicit or explicit orientations both to empirical data in the form of verifiable perceptions and to other data or awareness (nightmares, phobias, psychoses, neuroses, and all the other creatures living in the fertile swamp of the subconscious, the collective unconscious, or Jung's "unconscious psyche"¹²) that are not verifiable or, at least, are less easily verifiable.¹³ According to John Boyd, the process or act of orientation (what Boyd calls "the Big O" in the OODA [observation-orientation-decision-action] loop) also is influenced by genetic heritage and cultural traditions.¹⁴ Thus, the orientation of American leaders is different than the orientation of, say, Japanese or Chinese leaders. The orientation of

capitalists and their leaders is different than the orientation of socialists and their leaders.

Unlike knowledge systems, belief systems are highly individualized. Why? They include the stuff of the unconscious and subconscious, powerful elements of which others and even the bearer may be unaware. Even though the target of information warfare is the mind of enemy leadership, it is glib reductionism to think of the enemy as being of "one mind." The enemy is really many individual enemies, many minds. This only complicates the problem slightly. For example, if the enemy is dispersed, separate minds can be attacked separately, using the fact of isolation to the attacker's advantage. If the enemy is concentrated (and over half the people on the planet will live in metropolitan complexes by the year 2020 and will be accessible in large numbers by way of information technology), the attack can be prosecuted against large groups. Even so, the aim of warfare is to subdue the hostile will of leaders and decision makers. This can be done directly by attacks aimed at influencing or manipulating the leader's knowledge or beliefs or indirectly by attacking the knowledge or beliefs of those upon whom the leader depends for action. Leaders and decision makers usually are not difficult to identify in any organization hierarchy. When an organization applies power or force, that organization most often assumes hierarchical characteristics. Thus, the knowledge and beliefs of decision makers are the Achilles' heel of hierarchies.

Knowledge systems, because they are more scientific, are less influenced by culture and by irrational or nonverifiable factors than are belief systems, yet both knowledge systems and belief systems are components present in every human decision-making system.¹⁵ What is known, including the methods by which it came to be known, can be tested by its relation to something else and determined to be valid or invalid, true or false, real or unreal. What is believed is not subject to all the same tests. Even so, beliefs are no less compelling than

empirically derived knowledge. Both knowledge and beliefs affect human decision making. Since the aim of warfare is to influence adversary behavior by influencing adversary decisions, information warfare actions must be directed against both the adversary's knowledge systems and belief systems. If an adversary is organized as a coalition of multiple and cooperative centers of gravity, many culturally conditioned belief systems may exist within the coalition. These may be engaged and defeated in detail. The coalition need not be separate states or groups working as an alliance. The coalition can be the constituencies within a state or within groups. Clausewitz was correct in asserting the potential liabilities associated with allies and coalitions.¹⁶ Moreover, leaders and decision makers of the coalition provide the most fertile targets for direct or indirect attacks.

Targeting Epistemology

The target system of information warfare can include every element in the epistemology of an adversary. *Epistemology* means the entire "organization, structure, methods, and validity of knowledge."¹⁷ In layperson's terms, it means everything a human organism—an individual or a group—holds to be true or real, no matter whether that which is held as true or real was acquired as knowledge or as a belief. At the strategic level, the aim of a "perfect" information warfare campaign is to influence adversary choices, and hence adversary behavior, without the adversary's awareness that choices and behavior are being influenced. Even though this aim is difficult to attain, it remains the goal of a perfect information warfare campaign at the strategic level. A successful, although not necessarily perfect, information warfare campaign waged at the strategic level will result in adversary decisions (and hence actions) that consistently mismatch or fail to support the intentions or aims of the adversary leader.

A successful information warfare campaign waged at the operational level will

support strategic objectives by influencing the adversary's ability to make decisions in a timely or effective manner. Said another way, the aim of information warfare activities at the operational level is to so complicate or confound the adversary's decision-making process that the adversary cannot act or behave in a coordinated or effective way. In information warfare, the goal is to harmonize the activities taken at the operational level with those taken at the strategic level so that, taken altogether, the adversary makes decisions that result in actions that consistently support our aims by consistently failing to support the adversary's aims.

At the strategic level, the leaders contemplating an information warfare campaign need to know the answers to at least three questions. First, what is the relationship of the information warfare campaign to the larger aims of the campaign? Second, what is it we wish the adversary leaders to know or believe when the information warfare campaign is concluded? That is, what is the desired epistemological end-state and consequently the success criterion? Third, what are the best information warfare tools to employ in order to meet the established success criteria? That is, how will "means" be related to "ends"?

At the operational level, the leaders responsible for prosecuting the "grand tactics" also need the answers to some questions. Will there be any withheld targets or prohibited weapons in the information warfare attacks? Is the epistemological end-state to be reached all at once, everywhere, or are there interim states that need to be reached in specific geographical areas, in a specific sequence, or in specific sectors of information activity? The questions of "command and signal" also need to be addressed. Specifically, leaders at the operational level need to know when attacks will be terminated and the means by which the termination order will be communicated. These are important questions because information weapons, depending on the weapons used, may cause collateral damage to the attacker's knowl-

edge and belief systems.¹⁸ In the worst case, the adversary's response could include counterattacks against "friendly" information systems that are somehow indistinguishable from collateral damage caused by the information analog of "friendly fire." This thought requires some elaboration.

Warfare is a human social activity.¹⁹ The workplace of warriors is society, the societies of those engaged in combat and the societies of active and passive spectator groups. Because it is a human activity—and one dependent on human action, reaction, and interaction—the outcomes of some warfare activities may be unpredictable. As Grant Hammond notes in "Paradoxes of War," if the outcomes of a war could be known in advance, there would be scant reasons for the loser to fight in the first place.²⁰ Moreover, there may be lag times between action and response; some outcomes take longer to develop than others. Thus, the notion that World War II was the outcome of World War I (or the peace treaty that terminated combat) may very well be true. The unpredictability, however, is not confined to the consequences of war termination. Specific actions in warfare can have specific and unpredictable reactions.

Information attacks—attacks aimed at the knowledge or belief systems of adversaries—can have consequences that are as unpredictable as attacks aimed at the physical destruction of property or combat equipment or those aimed at killing human beings. Suffice it to say that information attacks have stochastic effects and that unless these are considered and evaluated in advance, an information attack may not have the effect ultimately desired. Worse, it may have consequences that are so undesirable that the attacker will rue that an attack was made in the first place. The notion of stochastic effects, like the notion of collateral damage, needs to be considered at both the strategic and operational levels of information warfare.

The Target Sets of Information Warfare

The more dependent the adversary is on information systems for decision making, the more vulnerable he is to hostile manipulation of those systems. Software viruses only hurt those dependent on software. Radio-electronic combat only works against forces reliant on radios or electronics. Electromagnetic pulse generators—unless the generator is a nuclear weapon—do not affect human couriers and runners. While this suggests that only postindustrial states or groups are highly vulnerable to information warfare, the opposite may be the case for two reasons. First, preindustrial or agrarian societies still have vulnerable epistemological systems. Because information warfare can be prosecuted against the adversary's entire epistemology—both knowledge systems and belief systems—even preindustrial agrarian or primitive societies are vulnerable to information warfare. Second, industrial societies, and even some advanced industrial societies, may acquire much of their telecommunications infrastructure from more advanced or postindustrial societies or groups.

By way of analogy, consider the case of the homeowner and the architect. The homeowner may not be aware of flaws in his or her residence, but the architect is aware. Likewise, the operator or "owner" of a telecommunications system designed or built by others may be unaware of important features of which only the designer or manufacturer has knowledge. If the architect is not directly subordinate or accountable to "the owner," then the potential exists for the architect to exploit the hidden features to his own advantage. In the warfare of business competition, the architect may have the means, motive, and opportunity to exploit these features to meet the objectives of the firm, whether or not the government or the state approves of these actions.

In the case of advanced societies or groups, attacks against telecommunications systems can wreak havoc with an adversary's ability to make effective decisions in war-

fare. Yet, one should also appreciate that an apparition in the sky, even a natural phenomenon like a solar eclipse, can be used to attack the belief systems of a less advanced group. Totems and taboos might function equally as well as the targets or the tools of information warfare against a primitive group. Thus, vulnerability to information warfare is nearly universal, the differences being only a matter of degree.

An Illustration of Complexity

Information warfare is a complex notion. It is complex because the weapons employed are and always have been as common as words, pictures, and images, even though today these may be communicated or manipulated in uncommon ways. It is complex because the attacks are crafted by minds to affect minds. In addition, it is complex because the attacks can be direct or indirect, aimed at internal or external constituencies, the only constant being the effect sought. The desired effect of information warfare is to influence and change what the adversary believes or what the adversary knows.

The Sepoy Mutiny of 1857-58 provides an example of the complexity. The mutiny reportedly was triggered by a rumor that the British were coating rifle cartridges in animal fat.²¹ Contact with this fat was taboo to the Hindu and Muslim sepoys (Indian natives in the British army). Even though the cartridge coating was *not* animal fat and could be subjected to scientific tests that would result in this *knowledge*, the sepoy *believed* the substance was animal fat. This belief was more compelling to the primitive sepoy than knowledge. Thus, it was belief, not knowledge, that influenced sepoy behavior and triggered a difficult struggle between the British and the Indians. This case is also illustrative of the fact that even though the use of this misinformation was directed against the British leadership, the attack was indirect. It was the sepoy leaders who started the rumor, and in so doing attacked the belief systems of both Hindu and Mus-

lim sepoys to spur them to rebel against their British masters.

Thus, information warfare can be waged both internally and externally, by, against, or between societies or groups of varied technomic capability (a combination of advances in technology and the increase of economic wealth).²² When waged against internal constituencies, its aim is to use those constituencies to meet the larger aim of warfare: subduing the hostile will of an external adversary. When information warfare is prosecuted externally, the object is to subdue the hostile will of external adversary leaders.

Vulnerable Sophisticates?

In states or groups with high technomic capability, the target set for information warfare at the strategic level is wonderfully rich: telecommunications and telephony,²³ space-based sensors, communications relay systems; automated aids to financial, banking, and commercial transactions; supporting power production and distribution systems; cultural systems of all kinds; and the whole gamut of hardware and software that constitutes how the adversary knows and what the adversary believes. Strategic information systems in states with high technomic capability oftentimes are mirrored by operational-level ones of equal complexity. All are vulnerable to attack.

Information warfare need not be deferred until hostility becomes open. Adversary leadership will be less likely to fight if it believes one or more of the following: that violence is bad, or that they will be without allies, or that they will face harsh sanctions should fighting erupt, or that their industrial base will not support prolonged warfare, or that their armed forces are unready. Should actual fighting break out, attacks at the operational level can harmonize with attacks at the strategic level.

The target set at the operational level is equally lucrative when the adversary has high technomic capability and relies on

automated aids to fight. Hierarchical systems are most vulnerable, but even networks have control or relay nodes that are susceptible to attack. To function effectively, networks have hierarchical elements or nodes. Often these elements are invisible—embedded software protocols, filters, sort instructions, and the like.²⁴ That they are more difficult to attack may not make them immune to attack.

The higher its technomic capability and the greater the number of its interactions with other groups (including internal groups) or states, the greater the state or group's potential vulnerability to information warfare. The vulnerability may increase as network size increases, dependence on the information transacted increases, or the number or volume of transactions increases. Consequently, a state or group "engaged" worldwide may be exposed or vulnerable worldwide. (If the objective of engagement is a strategic campaign aimed at affecting the knowledge or beliefs of others, then those engaged are, of course, similarly vulnerable.) Democracies are no less vulnerable than totalitarian regimes, although democratic social systems, as groups, may be somewhat more fault-tolerant. By that is meant that democracies promote diversity and diversity increases the tolerance for difference. This willingness to accept diversity (and even the bizarre), the routine co-existence of contradictory knowledge and different beliefs among individuals and groups, and the constant attempts at manipulation by marketing experts do not reduce the vulnerability of a democracy, but they do mitigate the impact of information warfare attacks. Said another way, many people in democratic nations may be immune to attacks because their knowledge may be limited, their belief systems may always be in flux, and much information registers only as noise. Thus, images of televised eroticism may have little effect on many in the United States. Yet, the same images that almost are mundane in the United States could have

dramatic effects if televised in China, Iraq, or Iran.²⁵

Even though the democracy's social system may be fault-tolerant, its technomic control apparatus may be less so. Banking, finance, trade, travel, and air traffic control are now and increasingly will become more dependent on information technology systems. In 1992 the United States invested over \$210 billion on information technology (about half the level of worldwide investment), and the amount invested is expected to grow about 18 percent each year for the next several years.²⁶ As dependence on information systems grows, warfare waged by nonstate groups—terrorists, religious extremists, hostile businesses—against information systems constitutes a real threat. The bombing of the World Trade Center, whatever other general or specific objectives it might have had, apparently was designed to inflict serious damage on the trading and banking capability of the United States. The information warfare component of some future strategic warfare campaign waged by terrorists certainly will not fail to include the power-production facilities and communications systems serving the principal target. Simultaneous attacks against widely dispersed nodes could have a strategic effect. That is, they could affect the knowledge, beliefs, and the will of leaders.

A cautionary note: because an information warfare campaign at the *strategic* level aims to subdue hostile will by affecting the knowledge and beliefs of the adversary, it cannot discriminate between combatants and noncombatants. Because the weapons of information warfare systematically attack the adversary's knowledge and belief systems (that which makes us different from other species), the likely outcomes of information warfare need to be evaluated consciously before information attacks are prosecuted. A successful information warfare campaign interposes a false reality on the human target. At the strategic level, these targets include both combatants and noncombatants. The interposition of a false reality ultimately

may be as wrongful and inhumane as the wanton destruction of crops. To unhinge a noncombatant from reality, especially when the effects cannot be known or controlled, may be no less wrongful than to force another into starvation or cannibalism. Said another way, the principles of just war and just conduct in warfare need to be evaluated whenever *strategic* information warfare is contemplated.

Deception and disinformation, radio-electronic combat, propaganda, and the whole gamut of "psychological warfare" or command and control warfare attacks against enemy combatants at the *operational* level cannot be said to be wrongful. These aim to subdue without fighting or to reduce the amount of violence required. Becoming unhinged from reality in combat, like death or some other form of suffering, is a risk of which combatants are aware and is a possibility that combatants must accept. Thus, as long as information warfare and weapons are restricted by norms or laws to the operational level of warfare, it would appear that they are no more or any less evil than any other weapon. The problem remains a two-fold one: determining the morality of an information warfare campaign waged at the strategic level and restricting the use of information weapons to the operational level.

The decision to pursue information warfare or develop information weapons is a leadership decision. It is a strategic decision in the United States because it is the Congress, representing the entire citizenry, that links means to ends. In the United States, such a program (if done by the state) would be done with money appropriated by the Congress. The Congress, or its oversight committees, will evaluate the morality of information warfare. In the wake of this evaluation, the Congress may confine these weapons and their use to the operational level of warfare. The Congress may also establish safeguards to prevent any such weapons so developed from being used against internal constituencies. The legislative branch also may make laws preventing the

use of information weapons against non-US noncombatants and internal constituencies. As out-sourcing and contracting-out initiatives increase, the Congress also can be expected to act to prevent some commercial enterprise from developing such weapons. (Have not news stories and "exposés" produced by commercial news enterprises proven to be contrived, aimed at influencing our knowledge and beliefs? Have not subliminal messages been used in the past in attempts to influence our purchasing behavior? Have not hackers entered and affected—or infected—databases already? We need to consider that there may be only a slim difference between a hacker and a terrorist in the information age. This is especially so if the hacker can attack things like finance, credit ratings, college transcripts, or other databases upon which technomic institutions depend.) The political leaders in the United States can be expected to consider the morality of information weapons and information warfare, no matter which group develops the weapons or engages in the warfare, and to regulate their use accordingly. The Congress very likely will conclude that the employment of information weapons at the operational level is useful and necessary, but that employment against noncombatants, or their employment at the strategic level is wrong.

The United States should expect that its information systems are vulnerable to attack. It should further expect that attacks, when they come, may come in advance of any formal declaration of hostile intent by an adversary state. When they come, the attacks will be prosecuted against both knowledge systems and belief systems, aimed at influencing leadership choices. The knowledge and beliefs of leaders will be attacked both directly and indirectly. Noncombatants, those upon whom leaders depend for support and action, will be targets. This is what we have to look forward to in 2020 or sooner. □

Notes

1. Information warfare sometimes is erroneously referred to as command and control warfare, or C²W. The aim of C²W is to use physical and radio-electronic combat attacks against enemy information systems to separate enemy forces from enemy leadership. In theory, information warfare actually is a much larger set of activities aimed at the mind and will of the enemy.
2. Chris Mader, *Information Systems: Technology, Economics, Applications* (Chicago: Science Research Associates, Inc., 1974), 3.
3. The "waves" of societies are described by Alvin Toffler in *The Third Wave* (New York: William Morrow and Company, Inc., 1980). See also Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (Boston: Little, Brown and Company, 1993). A seminal work on institutional forms is forthcoming from David Ronfeldt.
4. John Arquilla and David Ronfeldt, "Cyberwar is Coming!" *Comparative Strategy* 2 (April-June 1993): 141-65.
5. Martin van Creveld, *The Transformation of War* (New York: Free Press, 1991), 196-205. Words like *war* and the lately contrived *warfighter* confuse the *warriors* in a democracy by misuse. In the United States, *War* (with a big *W*) is declared by the Congress: the people representing all the people. Executive *War Powers* are really *warfare powers*. The days of Clausewitzian, trinitarian Wars may very well be over, as van Creveld suggests. The days of warfare, however, are not over.
6. Sun Tzu, *The Art of War*, trans. Samuel B. Griffith (New York: Oxford University Press, 1971), 77.
7. Richard Szafranski, "Toward a Theory of Neocortical Warfare: Pursuing the Acme of Skill," *Military Review*, November 1994; and idem, "When Waves Collide: Conflict in the Next Century," *JFQ: Joint Force Quarterly*, Winter 1994-95.
8. Joseph A. Engelbrecht, "War Termination: Why Does a State Decide to Stop Fighting?" (PhD diss., Columbia University, 1992). Colonel Engelbrecht is a colleague at the Air University's Air War College.
9. Arquilla and Ronfeldt, note 9, 162. According to this definition, a message with no discernible "meaning" is still "information." This definition is useful when contemplating the tactics of information warfare.
10. Ibid.
11. *Phenomenology* can be defined as "the theory of the appearances fundamental to all empirical knowledge." Dorion Cairns, in Dagobert D. Runes, ed., *Dictionary of Philosophy* (Totowa, N.J.: Littlefield, Adams & Co., Ltd., 1962), 231-34.
12. C. G. Jung, *The Undiscovered Self* (New York: The New American Library, Mentor Book, 1958), 102.
13. Information warfare requires that philosophers, cultural anthropologists, area specialists, linguists, and semanticists join the "operations" staff. The days have passed when war colleges or staff colleges could neglect these other disciplines.
14. John R. Boyd, briefing slides, subject: A Discourse On Winning and Losing, August 1987. Maxwell AFB, Alabama.
15. Ibid.
16. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), book 6, chapter 6, 372-76.
17. Ledger Wood, in Runes, 94-96.
18. The effects to which I refer are more complicated than the inability to prevent your own jamming from interfering with your own communications systems. These unconfined, spillover effects of stray electrons can be modeled and some compensation can be made for their effects. The weapons and effects of information warfare are not so easily confinable or

controllable. In warfare it is common to both demonize and ridicule the enemy. Ridicule often takes the form of jokes. If these jokes ridicule an enemy from a different ethnic group, these jokes become officially sanctioned racist jokes. If the ethnic group is part of our own citizenry, such attacks can cause collateral damage. The collateral damage to the armed forces may have effects as far-reaching as the appearance of officially condoned racism. If one accepts that weapons and attacks have stochastic effects, then some consequences are unpredictable.

19. Van Creveld, 35.

20. Grant T. Hammond, "Paradoxes of War," *JFQ: Joint Forces Quarterly*, Spring 1994. Dr Hammond is a colleague on Air University's Air War College faculty.

21. George C. Kohn, *Dictionary of Wars* (New York: Facts On File Publications, 1986), 214.

22. *Technomic* is a word coined by Col Joseph A. Engelbrecht. He defines it to mean "of or relating to progress in the development of the application of scientific principle (technology), and in the development of wealth (economics), and in the interrelationship between advances in science and the spread and increase of economic wealth. Technomic vitality. Technomic proliferation."

23. Gerald R. Hurst, "Taking down Telecommunications" (Thesis, School of Advanced Airpower Studies, Air University, Maxwell Air Force Base, Ala., 28 May 1993).

24. Ibid.

25. Iran provides a good example. The Majles investigation into the Iranian department of "Voice and Vision" illuminates Iran's sensitivity to the content and meaning of pictorial messages. Consider these comments from the investigation:

A basic criticism of the pictorial programs of the Voice and Vision is lack of attention to full veiling of women, lack of attention to the chador, and spreading of the culture of the "manteau" and scarves of the immoral kind.

The grand leader on occasions has given opinions and directives to the Voice and Vision organization or its director. Unfortunately, the instructions and directives of his honor were not implemented. For example: . . . From 1368 [21 March 1989-20 March 1990] to 1370 [21 March 1990-20 March 1991], he made reminders to the Voice and Vision on 14 occasions, the most important of which concern: A) Misinformation. B) The low level of quality of the beyond-the-border programs and failure to propagate and spread Islamic views in them. C) The broadcast of blasphemous sentences concerning the Sire of the Pious. . . . E) Showing actual persons in the role of the infallible imams.

See "Majles Investigates Activities of Voice and Vision," 3, 4, 15 November 1993, 5-6, in *Foreign Broadcast Information Service Report: Near East and South Asia* (FBIS-NES-94-016-S), 25 January 1994, 6-8. I am grateful to Dr George Stein of the Air University's Air War College faculty for pointing out this example of what simultaneously might be internal information warfare and potential vulnerability to external information warfare. Saudi Arabia recently joined China as the most recent nation to outlaw satellite television receivers. One can easily appreciate the effects that Music Television (MTV) might have on such cultures.

26. A telecommunications executive speaking in an Air University forum under the promise of nonattribution disclosed these estimated figures.



AIRPOWER AND PEACEKEEPING

LT COL BROOKS L. BASH, USAF

The expenses required to prevent a war are much lighter than those that will, if not prevented, be absolutely necessary to maintain it.

—Benjamin Franklin

THE ROLE of airpower in peacekeeping is auxiliary, and its use should ultimately improve the chances for success. Specifically, airpower must support both general peacekeeping principles and specific objectives of an operation.

In simplest terms, peacekeeping is primarily a diplomatic tool used to stimulate the peaceful resolution of conflict and is not an end in itself. Since the existence of peacekeeping was not foreseen in the United Nations

(UN) Charter, the term has no internationally accepted definition. Consequently, this article uses a synthesis of the outlooks of the International Peace Academy and the UN:

Peacekeeping is an international technique used in conjunction with diplomacy for the purpose of conflict management. Peacekeeping operations employ voluntary military and diplomatic personnel from one or more countries, either to create the conditions for conflict resolution or to prevent further hostilities through the supervision of an

interim or final settlement of conflict. Peacekeeping forces are impartial and exist only with the consent of all disputing parties; therefore, peacekeeping forces do not interfere with the internal affairs of the host countries or use coercion to enforce agreements—the use of force is limited to self-defense.¹

This definition embodies three principles or foundations that set peacekeeping apart from other international methods of conflict control or resolution: (1) impartiality, (2) consent, and (3) force limited to self-defense.

*Peacekeeping is not a soldier's job,
but only a soldier can do it.*

—Anonymous UN Peacekeeping Soldier

The strategic contributions of US airpower for international recognition of peacekeeping operations can be significant. The willingness of the sole remaining superpower to use its valuable airpower assets reflects an important commitment, both financially and materially, to UN operations.² In the past, the US provided only political and financial support, yet the evolving international environment now expects direct contributions of personnel and material. Consequently, the lack of direct US involvement would signal that the particular operation is not important or does not have a good chance for success. Therefore, in many circumstances, US airpower commitments may foster greater international confidence and reassure contributing countries that their commitment of resources is prudent.

In addition to showing commitment, airpower also can provide added credibility to peacekeeping in the eyes of the disputing parties. Improved effectiveness in observation and reporting can reduce mistrust among those parties and foster the confidence building necessary for long-term res-

olution of differences. One such example occurred in the Sinai in 1980, when the US provided modern surveillance and communications equipment to the peacekeepers, thus enhancing the confidence of Egypt and Israel during disengagement and cease-fire.³ In sum, the commitment of airpower acts as a political statement that signals a higher level of US commitment to the world community, adds credibility to UN peacekeeping, and has the added benefit of improving the efficiency and effectiveness of peacekeeping operations.

Despite these strategic benefits, attendant adverse consequences of using airpower may occur, and one must consider them in the context of the specific peacekeeping situation. These consequences include problems with ethnicity, philosophy, and politics; negative perceptions of airpower; economic restrictions; and the unpredictable utility of airpower.

First, traditional peacekeepers argue that airpower and high technology have little utility for dealing with problems rooted in ethnicity, philosophy, and politics. However, the use of airpower does not suggest that it can replace the personal interaction required of the ground peacekeeping force. Air assets used in peacekeeping are simply a tool to enhance the efforts of the peace builders to achieve long-term resolution of hostilities. Furthermore, this argument is closely related to the concept of national sovereignty. Suffice it to say that this is a major concern and may inhibit the use of airpower if the disputing parties reject intrusive technology. Nevertheless, this issue would be resolved prior to a given operation and, therefore, would not directly inhibit its chances for success.

Second, there is significant concern about the negative perceptions of disputing parties who face the destructive potential of US air forces. Ultimately, this problem is not specific to air assets but is a part of the larger philosophical argument concerning the use of force. Indeed, negative perceptions among disputing parties may be justified if the UN

continues to close the gap between peacekeeping and peace enforcement. Granted, since airpower may amplify these negative perceptions, its users must be sensitive to fundamental peacekeeping principles. Therefore, the UN must make specific efforts to reassure the disputing parties.

Third, there is justifiable concern over the financial implications of airpower operations. Due to the increasing size and number of these operations, the UN peacekeeping budget has mushroomed from \$421 million in 1991 to over \$2.7 billion in 1992.⁴ Accordingly, UN officials are extremely cost conscious. In fact, the problem is so acute that the UN recently criticized Canadian peacekeepers as "high-cost" contributors due to their insistence on deploying properly equipped units.⁵ However, UN Secretary-General Boutros Boutros-Ghali recently proposed that the great powers provide high-value assets free of cost. Consequently, cost will be a domestic political concern rather than a burden on already-strapped UN coffers. From a US perspective, these costs will have to be weighed against the potential contributions of airpower towards the success of peacekeeping and the conflict-control process in general.

Finally, policymakers must have a sense of airpower's potential utility before they decide on a political course of action. Unfortunately, the benefits of airpower will not be constant due to numerous variables such as the scope and length of the operation, geography, and weather. The combination of these variables and others within the unique peacekeeping paradigm makes isolation of the specific benefits of airpower extremely difficult. The remainder of this article provides a general assessment of airpower capabilities in order to give policymakers a sense of its operational utility.

Operational Analysis

Using airpower in peacekeeping may prompt images of highly sophisticated air-

borne sensing equipment recording every ground movement, aircraft whisking peacekeepers to trouble spots, satellites peering over the shoulders of troops, and sophisticated communications instantaneously reporting violations of accords. Although these capabilities may be possible with increased US involvement, associated limitations of airpower in the peacekeeping context also exist.

Peacekeeping forces, necessarily made up of military assets, are the keystone to a successful operation. These forces perform peacekeeping tasks in support of the political peacemaking or peace-building objectives. Consequently, any degradation of military performance due to difficulties or problems will have a direct effect on the successful outcome of any given operation. To examine the role of the military and—specifically—air forces, we may consider their services in a functional context. The functional categories of command and control (C²), communications, intelligence, mobility, and force protection are common to all peacekeeping tasks and provide a framework to examine the strengths and weaknesses of airpower. The relative predominance of each functional category fluctuates according to the specific peacekeeping operation but is representative of the spectrum of potential requirements. These functional duties, combined with unique characteristics of airpower, bring to peacekeeping a set of tools with the potential to overcome habitual difficulties. In fact, the characteristics of responsiveness, flexibility, mobility, and range may apply particularly well to numerous situations often faced by peacekeepers.

Command and Control

Effective C² and the fundamental command principle of centralization are vital to peacekeeping. Although airpower may indirectly contribute to C² through improved communications (discussed below), the concern here is the task of integrating high-value US

air assets into the UN C² structure. The satisfactory resolution of this problem will dictate whether or not US airpower can feasibly be included in peacekeeping operations.

From a US perspective, the greatest obstacle to committing air assets is the question of who will command and control these assets. Historically, the UN demands operational control of military forces under a UN commander. Traditionally, however, the US is reluctant to relinquish the command of military assets—especially high-value air forces—in risky situations. This position is



The airpower characteristics of responsiveness, flexibility, mobility, and range may apply particularly well to the numerous situations often faced by peacekeepers. Airpower gives commanders another tool to enhance both effectiveness and efficiency of peacekeeping operations.

summed up in the annual report of the secretary of defense: "The United States will not delegate to anyone outside our government the authority to commit U.S. forces."⁶ But this position may not be inflexible when applied to peacekeeping.

For example, the "traditional" aspects of this position have recently lost their force insofar as the US involvement in Somalia set a precedent for command relationships in future UN peacekeeping operations. In Somalia, Turkish general Cevik Bir commanded over 4,000 US troops—the largest number ever to serve under a foreign commander in a UN operation.⁷ Furthermore, the Russians have also broken with tradition by indicating their willingness to commit military forces under UN operational command.⁸

Moreover, the fear of committing US forces to high-risk situations incorrectly assumes that airpower may be used without US approval. In actuality, the wording of the UN mandate and, if necessary, a US veto in the Security Council would allow the US to control its airpower assets at the strategic level.

Concerns over operational C² emanate from the dual fear of misapplication of airpower and excessive exposure to risk. Indeed, the fear that airpower may be used improperly correctly identifies a UN structural weakness. Specifically, the UN does not have the capability or expertise to run a large airpower operation, and the employment of airpower would therefore be accomplished ad hoc. Maj Jay Meester, who was involved in the Congo peacekeeping operation, succinctly supports this fear:

Perhaps the most glaring problems are the misuse of tactical airpower and the inability to effectively command and control it. Actually these factors are tied together. [Non-US] Group commanders are, by and large, minimally efficient. . . . Consequently inordinate demands for air support are made with little appreciation of air capabilities. Control of air assets has been decentralized to allow independent action on the part of each ground commander.⁹

The US can, however, mitigate these concerns through the structure of airpower participation. One organizational solution may be to create a UN "air component commander" headed by a US airman. This concept would be in line with the current peacekeeping tradition of dividing national forces into sectors. If the US commanded the air sector, our air forces would retain substantial operating independence yet would remain subordinate to the needs of the overall UN force commander. In essence, this arrangement would be similar to the current C² structure used for US fighter aircraft supporting the Bosnia no-fly zone.¹⁰ Although this operation falls under NATO command, it remains under strict political control of the UN. Whereas the US maintains operational control through NATO, the ultimate strategic direction flows through the UN force commander and is approved by the Security Council.

Similarly, concerns about risks can be mitigated through the aforementioned command arrangement. However, the UN force commander will always have the prerogative of overriding operational recommendations. Even so, US fears may be without basis due to the fact that peacekeeping is not a combat operation. The risk associated with the use of airpower in peacekeeping is fundamentally different from the risk associated with its use in combat. Throughout history, only a handful of peacekeeping aircraft has been intentionally destroyed.

Thus, strategic C² of US airpower will ultimately reside with the US by virtue of its position on the Security Council. Airpower assets should not be committed to an unwanted action without US approval. Operationally, US concerns for effective airpower application and avoidance of unnecessary risk are warranted but can be solved by the integration of US expertise into the chain of command. The importance of this C² problem must not be minimized because its resolution is a prerequisite to achieving peacekeeping benefits in the other functional categories.

Communications

It is probably true to say that most peacekeeping operations will continue to use [communications] equipment about a generation behind those currently in use in the more modern and larger armies.

—*Peacekeeper's Handbook*

Although the structure of C² is important, the essence of its effectiveness is dependent on communications. Timely and adequate signal communications at all levels of the operation are necessary to effectively plan, direct, and control the various peacekeeping activities. At the strategic level, secure and reliable communications provide the interface between operations and UN headquarters. At the operational level, effective communications are necessary, not only for routine daily operations but also for the peacebuilding effort. Heretofore, sophisticated communications equipment in UN peacekeeping operations was either unavailable or prohibitively costly, resulting in less efficient peacekeeping communications capabilities.

In peacekeeping, communications are particularly difficult for three reasons. First, peacekeepers are often hampered by interoperability problems caused by variations in equipment, procedures, and languages among participating nations. Although one may argue that the integration of airpower may contribute to this problem, these difficulties will be pervasive regardless of the military approach the US ultimately employs in peacekeeping.

Second, the lack of permanent communications facilities often forces peacekeepers to rely on temporary and ad hoc arrangements. The current effort in Bosnia is illustrative insofar as peacekeepers rely on unreliable high-frequency radio communications.¹¹ According to a Canadian peacekeeper, "I was involved in setting up communications for several peacekeeping operations, and every time was completely different. We were never sure what would work until we hit the ground, and we were usually wrong

the first time. If someone was to ask me to pick a system to use for area surveillance in all these operations, I don't think it exists."¹²

Third, communications are often hampered by intentional degradation of communications capabilities. Because information is critical to the disputing parties, each routinely tries to gain an advantage through bugging and interference.¹³ Lt Gen Gustav Hägglund relates his experience as force commander of the UN Interim Force in Lebanon (UNIFIL): "The Norwegian battalion noticed that when it captured infiltrators and reported in Norwegian to the battalion headquarters, South Lebanon Army or Israeli Defense Forces patrols appeared on the scene of capture within minutes."¹⁴ In addition, UN communications are often purposely cut off to preclude the interference of the UN in planned confrontations. Communications efficiency is critical for rapid response, and the effectiveness of UN intervention rests primarily upon the speed and accuracy of initial reports.¹⁵

Although the problem of interoperability may be intractable, the communications problems of security, speed, range, and flexibility can all be improved with air force assets. Air assets cannot—or should not—replace land communications, but they can reduce the aforementioned problems through the use of satellites and, occasionally, airborne platforms. However, a trade-off exists between the potential benefits of using airpower and the disadvantages of increased costs and complexity—the latter leading to a natural reluctance to embrace air capabilities. *Peacekeeper's Handbook* aptly sums up this reluctance: "Contingents hitherto used in peacekeeping operations have come from small countries which neither need, nor can afford, the very sophisticated systems used by larger powers. Simple procedures and easily understood methodology will make for greater reliability."¹⁶ In other words, peacekeeping communications are hindered not necessarily by the lack of equipment but by accommodating the realities of a multinational force. Therefore, the

increasing availability of satellite communications to small countries makes this capability a viable consideration for the future.

Characteristics of satellite communications (e.g., capacity, flexibility, range, reliability, robustness, and resistance to jamming) are all useful to peacekeeping forces to help offset the increasing technical sophistication of disputing parties. The multinational effort in the Persian Gulf in 1990–91 relied extensively on satellite communications despite the modern communications system available in Saudi Arabia. In fact, over 90 percent of the communications into and out of the area of operations were carried over satellite systems, and thousands of inexpensive and reliable satellite communications receivers were used at the unit level.¹⁷ Notably, only a small percentage of these communications traveled over commercial satellite systems readily available to the UN. Consequently, US participation is essential if the UN is to have greater access to satellites. US defense systems such as Fleet Satellite Communications System (FLTSATCOM), Defense Satellite Communications System (DSCS), and Air Force Satellite Communications System (AFSATCOM) can all be adapted for peacekeeping use.¹⁸

In addition to satellites, US airborne communications platforms may be useful on an ad hoc basis. During the critical initial deployment of UN forces, permanent or land-line communications can be augmented by temporary airborne support. Likewise, in times of crisis, airborne communications can replace civil communications, which are susceptible to deterioration and unreliability at precisely the time they are needed the most.¹⁹

Clearly, communications enhanced by airpower can provide benefits to peacekeeping at all levels of command. At the strategic level, enhanced satellite capabilities will provide the UN force commander with reliable and secure communications for impartial negotiations and efficient access to UN headquarters. At the operational level, both satellite and airborne communications can

enhance effectiveness through greater ground-unit connectivity and reliability.

Intelligence

Reliable reporting is a cornerstone of all peace-keeping. Good observation devices are essential.

—Lt Gen Gustav Hägglund

Intelligence (i.e., *military information*, in the UN context) is essential to verify compliance with the terms of a peacekeeping agreement.²⁰ The primary source of such intelligence will always be peacekeepers on the ground; however, these forces have limitations—particularly in observation capabilities. Rarely do peacekeepers have access to satellite observation, airborne radars, or remotely piloted vehicles. General Hägglund states that “the only way for a peacekeeping force to gain access to this kind of [high-technology] information is for a great power to make it available.”²¹ Indeed, President George Bush confirmed the willingness of the US to help in this regard: “We will also broaden American support for monitoring, verification, reconnaissance and other requirements of UN peacekeeping or humanitarian assistance operations.”²² Therefore, increased US participation in intelligence gathering is a distinct possibility. Even though the US has significant national technical means (NTM) for intelligence, the difficulty will be to determine exactly what kind of intelligence the UN needs and how to make it available.

Perhaps the best way to determine the “what” is to focus on solving intelligence problems common to peacekeeping operations. First, peacekeepers cannot be everywhere at all times, especially when disputing parties do not necessarily want them to be knowledgeable of their activities. The incorporation of night- and all-weather imaging sensors will increase the time in which peacekeeping forces can operate effectively within a given territory. Such was the case

in the Sinai in 1975, when peacekeepers used aerial surveillance and satellite reconnaissance to create a system to monitor compliance with cease-fire accords.²³

Second, the inability to detect potential violations or impending violence in a timely manner is problematic. Airborne and satellite observation and signals-interception capabilities may direct peacekeepers to potential problems and may increase manpower efficiency. For example, both UNIFIL and the UN Operation in the Congo (UNOC) experienced several incidents—including direct attacks on peacekeeping troops—that were avoidable had timely information been available.²⁴ Air intelligence provides the force commander with an additional tool to help determine the military aims of disputing parties.

Third, peacekeepers have difficulty holding disputing parties accountable for violations of agreements. Minor violations will lead to larger retributions; therefore, unless the disputing parties are effectively deterred from violations, the peacekeeping operation may escalate uncontrollably. For example, during one nine-week period in the UN Iran-Iraq Observer Group Mission (UNIOGM), peacekeepers recorded 1,072 cease-fire violations, and the UN was unable to hold the disputing parties accountable.²⁵ Better observation techniques—especially the threat of releasing incriminating information—may improve deterrence of violations.

A number of air and space intelligence systems can help solve such problems. Possible sensors for aerial surveillance include synthetic aperture radar, thermal infrared line scanners, and electro-optical sensors.²⁶ In addition, space platforms can support the spectrum of peacekeeping intelligence needs through signals intelligence (SIGINT) and imagery intelligence (IMINT) to identify and assess troop disposition and movements. Multispectral imagery (MSI) enables detection of troop movement, and the Defense Satellite Program (DSP) can provide information on hostile activities through infrared sensing.²⁷ Most importantly, satellite

intelligence collection can be especially timely if combined with satellite communications.

Generally, there is little disagreement on *what* intelligence can provide to peacekeeping. The larger obstacle concerns the *how* part of the problem (i.e., intelligence dissemination), which includes (1) sensitivity to excessive information collection and (2) management of classified information.

Increased air surveillance will cause the sovereignty issue to manifest itself fully. Herein lies the basis for the UN characterization of *intelligence as military information*, insofar as the former connotes both overt and covert intelligence.²⁸ In fact, peacekeeping operations in the Sinai, Cyprus, and—most recently—Namibia were specifically denied high-technology information gathering.²⁹ Consequently, disputing parties must be convinced that air intelligence collections will be overt and conducted with the knowledge of all disputing parties.

Nevertheless, mounting evidence indicates that peacekeepers may be allowed greater freedom in the area of surveillance as nations become more familiar with satellites. That is, the rigidity of sovereignty is beginning to erode, and the perception that satellite imagery is intrusive is changing due to increasing use and access of that capability. The precedent for using satellite imagery was set almost two decades ago when the US provided Syria and Israel with satellite photography every two weeks during the peacekeeping efforts of the UN Disengagement Observer Force.³⁰ Further, proliferation of obtrusive technology among developing nations may serve to desensitize disputants as they gain access to satellite capabilities. Satellite images are now available in the open market from countries such as France, Germany, Japan, and—most recently—Russia.³¹ In addition, over 100 developing nations are involved in some aspect of space research, and up to 18 are expected to have satellite receiving stations by the turn of the century.³² A Canadian peacekeeping

study concludes that intelligence assets would foster greater confidence among disputing parties through verification that all signatories to a treaty are actually complying with its terms.³³

The first difficulty of increased intelligence access is developing an acceptable system to manage the dissemination and interpretation of intelligence. Opponents argue that increased intelligence capabilities will result in greater infrastructure requirements and difficulties with information management. In fact, intelligence-processing requirements will exacerbate UN problems with resource management. Intelligence management requires interaction, collation, and fusion of multiple sources of intelligence to pinpoint the type, extent, and location of force activity. In addition, the workload on the functional aspects of communications and mobility will also multiply. Although intelligence growth will cause infrastructure expansion, this problem is not insurmountable.

The second difficulty is the challenge of managing intelligence information, especially that derived from NTM. Intelligence capabilities are traditionally shrouded by considerable security measures. Although the use of commercial imagery from US land satellite (LANDSAT) or the French SPOT systems would circumvent this problem, these systems have limited utility for peacekeeping. In 1990, LANDSAT users waited an average of 16 days for images; further, these commercial systems possess no signals-interception capabilities.³⁴

The two dissemination problems discussed previously may be solved by establishing an international intelligence organization. There are several proposals for organizations specifically designed to promote security through the use of satellite intelligence. The proposed International Satellite Monitoring Agency (ISMA)—which may be adapted to satisfy US security concerns³⁵—involves construction of an image-processing and interpretation center, ground-processing stations, and organic satellites. Unfortunately, such

international intelligence concepts belong to the distant future. Near-term UN satellite intelligence must utilize existing US intelligence infrastructure.

Most US intelligence assets can be used for UN purposes in a parasitic manner without substantial expense or degradation of capability. In other words, the US intelligence community need not specifically launch or move satellites to support UN activities but can adapt currently available products. Unfortunately, a negative consequence is a concern for the principle of impartiality since processing could not be truly international. But this problem may not be too great, considering the proliferation of satellite technology: by the end of the century, over 24 countries will be operating 48 unclassified remote-sensing satellites.³⁶

Thus, intelligence or information gathering represents one of the greatest potentials for the application of airpower in peacekeeping. Both airborne and satellite assets can provide information that will contribute to the success of peacekeeping through better observation. Factional groups may find it more difficult to anonymously disrupt agreements and operations, while the primary disputing parties will be deterred from violating agreements. Specifically, as R. Jeffrey Smith notes, "Nations that know what their enemies are doing are less likely to increase world tensions through actions born of fear. And nations that know their enemies are observing them are far less likely to threaten international peace through rash behavior. Governments are also more likely to propose and sign treaties if they believe they can verify their enemies' compliance with treaty terms."³⁷

Mobility

Historically, airpower in peacekeeping has taken the form of transportation and logistical support. Intertheater airlift support for UN peacekeeping is well established and needs little justification. However, the lack

of strategic airlift is a continuing concern and has had negative consequences in the past. For example, the airlift logistics system in the Congo operation was unable to fully support peacekeeping operations, and the first UN Emergency Force in place between Egypt and Israel required two years of emergency rations.³⁸ Indeed, the current demand for greater timeliness increases UN reliance on strategic airlift. For example, the UN recently proposed moving up to 30,000 US, European, and Russian troops to Bosnia within 72 hours of a peace agreement.³⁹ Undoubtedly, the absolute necessity of US strategic airlift will continue for the foreseeable future.

On the other hand, tactical airlift support for UN logistics and transportation has long been overlooked. Since peacekeepers rely almost exclusively on external support mechanisms, tactical mobility is essential for supply of food, billeting, equipment, maintenance, and medical treatment.⁴⁰ As such, freedom of movement is essential yet may be one of the most difficult obstacles to overcome for several reasons.

Modern combat zones, for instance, are saturated with mines—witness the fact that the UN protection force in Bosnia must contend with the nightly mining of essential roads.⁴¹ In addition, disputing parties often challenge freedom of movement in order to gain an advantage. This situation is a daily occurrence in Bosnia, where closed roads, vehicle checks, and harassing fire serve to manipulate peacekeepers and degrade their effectiveness.⁴² In fact, a recent relief convoy in the former Yugoslavia passed 90 roadblocks over a distance of only 250 miles.⁴³

In addition, geopolitical and geographic obstacles can make mobility impossible for peacekeepers. Again, one may turn to the situation in Bosnia, where the fate of thousands in isolated Sarajevo rests primarily on airlifted supplies.⁴⁴ The US is currently air-dropping up to 78 tons of cargo daily to regions unable to receive supplies via ground convoy.⁴⁵ Harry Summers recently

commented that "the airdrops were ridiculed when they first began and many—myself included—doubted their practical value . . . but we were wrong. . . . The relief airlift was not a symbolic display. Thousands in the region are alive today because of the dedication of US and allied airlifters."⁴⁶

Further, efficient mobility is critical to the effective deterrence of hostilities. Rapid show of force is generally considered to be an effective deterrent to the resumption of hostilities in peacekeeping.⁴⁷ Indeed, several experienced Canadian peacekeepers claim that a high state of readiness is a significant factor in avoiding escalation of conflict and decreasing the potential for loss of life.⁴⁸ Often, peacekeeping forces are placed in a position to gain quick local superiority by concentrating troops in hopes of persuading the violating party to back off. In Somalia in 1993, for example, US marines established a quick-reaction force that used helicopters for the specific purpose of controlling hostilities before they escalated.⁴⁹ The following general rule applies to peacekeeping: "maximum show of force ensures best minimum use of weapons."⁵⁰

Although both US fixed-wing and helicopter assets can enhance peacekeeping mobility, they carry with them certain disadvantages in terms of resources and cost. That is, efficient airlift will require an expanded ground infrastructure for planning missions, as well as loading and servicing aircraft. In addition, the UN may not be able to afford the expense associated with integrating increased tactical airlift.

US satellite capabilities such as weather information, mapping, and navigation assistance can provide further mobility improvements. For instance, the US Defense Meteorological Satellite Program (DMSP) is a source of weather information for peacekeepers. MSI capabilities can help identify suitable drop zones, helicopter landing zones, existing roads or airfields, and surface conditions affecting ground mobility.⁵¹ Moreover, the global positioning system (GPS) and the Navy Navigation Satellite Sys-

tem are available to peacekeepers.⁵² GPS receivers, readily available during the Persian Gulf War, could provide peacekeepers with enhanced navigation and improved verification of territorial agreements.

Lastly, the use of air assets for psychological operations (PSYOPS) in peacekeeping has value as a public information resource. PSYOPS can counter the effects of disinformation programs by factions of the disputing parties or can announce the terms of a cease-fire. Such operations might employ air resources as information-delivery platforms for radio and television broadcasting, loudspeakers, and printed literature. Using PSYOPS in conjunction with the greater mobility of UN officials might well lend credibility to the peacekeeping effort.

Clearly, improved strategic mobility can increase the timeliness of initial UN deployments and therefore minimize escalation of conflict. Additionally, tactical airlift provides the means of rapidly transporting security forces and supplies to forward areas by physically extending the reach of observers and negotiators. In support of humanitarian relief, tactical airlift can provide direct assistance by delivering food and medicine or transporting personnel for public services management, sanitation and hygiene, and medical support. Finally, satellite weather and mapping capabilities can assist both ground and air mobility.

Force Protection

A final function of all military forces is self-protection. In April 1983, 241 American peacekeepers were killed by a suicide car bomb in Lebanon; between October 1992 and mid-January 1993 in Bosnia, the UN recorded 54 attacks on its personnel, including the shelling of convoys.⁵³ In all, over 600 UN peacekeepers have been killed due to hostile actions or operational accidents, while another 200 were lost to "other causes."⁵⁴ Force protection is a growing concern, as evidenced by a statement from

Secretary-General Boutros Boutros-Ghali: "Innovative measures will be required to deal with the dangers facing United Nations personnel."⁵⁵ Airpower may well be one such innovative measure.

Peacekeeping forces rely on a perception among the disputing parties that disputants will be held accountable for compromising the safety of UN forces. Through a combination of air-enhanced mobility, communications, and intelligence, peacekeepers may enhance their safety by either avoiding trouble or deterring threatening actions.

Airborne assets can detect large expenditures of munitions or unannounced movements of forces. This capability, coupled with enhanced communications capabilities, permits faster notification of an impending threat to outposts. Canadian peacekeepers in UN Transition Assistance Group (UNTAG) in Namibia recognized the utility of this capability in 1989. Their after-action report specifically labeled the failure to receive prompt information on troop movements as "potentially disastrous" and recommended that national intelligence sources be used for self-defense in all future operations.⁵⁶

The capability to move reserve forces quickly—discussed previously—not only calms hostilities but also provides an added measure of force protection. Such action might have averted tragedy in 1961 when 44 isolated UN personnel in the Congo were attacked and ruthlessly massacred.⁵⁷ As a last resort, airpower can provide direct intervention with supporting fire in self-defense, or it can evacuate UN personnel from a deteriorating situation.

Airpower assets, as opposed to alternative military assets, may help alleviate the growing domestic demand to reduce risk to US military personnel. In this respect, the benefits of providing airpower are twofold. First, although air force personnel are not completely safe, they are relatively safer than ground forces, who are exposed to random bullets, shelling, and mines. Second, great powers are prime targets for hostage

taking by parties who seek to influence policy. In reality, air commitments are significantly less manpower-intensive than army or marine contingents. Accordingly, air support personnel can easily be located in a specific area, which is easier to protect than a peacekeeping zone containing ground forces spread among the disputing parties.

Nevertheless, airpower can never completely eliminate risk to US personnel. For example, in 1973 a Canadian peacekeeping flight was shot down by Syrian anti-aircraft artillery (AAA) fire, killing all nine peacekeepers aboard.⁵⁸ Similarly, one should not forget that UN Secretary-General Dag Hammarskjöld and seven UN staff members were killed in an aircraft accident during the Congo peacekeeping effort in 1961.

Fear of these and future incidents provides the strongest general arguments against the use of airpower. For example, with regard to the US proposal to provide airdrop relief in Bosnia, Lt Gen Philippe Morillon, current UN force commander in the former Yugoslavia, commented that "in the current climate of paranoia, everybody will shoot at everything in the air."⁵⁹ The general rightly based his observation on extreme factional instability and the presence of significant AAA capabilities. However, events are proving his concerns unfounded. Through June 1994, US cargo aircraft flew over 1,800 airland and over 2,800 airdrop missions without serious mishap, and their early success prompted Germany and France to join in the humanitarian airlift mission.⁶⁰

Military Effectiveness: Putting It Together

From a macro viewpoint, military forces ultimately serve in peacekeeping to help preserve a fragile peace and discourage further conflict. Airpower can enhance both effectiveness and efficiency as peacekeepers perform their many tasks. Although measures of effectiveness are extremely difficult

to define in peacekeeping, there is little doubt that one can accrue benefits and advantages from air capabilities. The synthesis of air-enhanced communications, intelligence, mobility, and force protection will greatly assist peacekeeping tasks. The latter include armistice observation; preservation of law and order; guarantee of right of passage; interposition of buffer forces; show of force; and supervision of disputed territories, withdrawals, POW exchanges, cease-fires, and elections.⁶¹ The humanitarian airlift operation in Bosnia provides an example of the potential of fusing various airpower assets.⁶² This airdrop operation uses space-based GPS assets to improve the accuracy of airdrops; airborne C² assets (E-2Cs and airborne warning and control system [AWACS] aircraft) to coordinate fighter escort and identification of threats; and intelligence satellites to provide digital-imaging reconnaissance to verify landing location of airdrops and future drop zones.

In addition to these potential operational benefits, the primary advantage of airpower may be the improvement of overall efficiency, which would bolster deterrence against breaking a fragile peace. First, the air component's ability to closely monitor the situation through electronic means and to move personnel over a wider range of outposts could discourage disputing parties and factions from attempting to disrupt the peacekeeping process. Second, the air com-

ponent's ability to quickly provide a show of force could help diffuse potential hostilities. Third, the ability to provide intelligence sharing could lead to improved trust and confidence among disputing parties. Fourth, the use of air assets for PSYOPS may improve conflict deterrence. That is, through the use of media capabilities, leaflets, or even loudspeakers, UN forces could directly communicate with the population or factional groups about the status of agreements or inform them of the UN presence. Finally, the presence of US air assets could provide tacit deterrence when disputants recognize the ability of these assets to quickly change peacekeeping into peace enforcement. Although peacekeeping avoids the use of force, concurrent diplomatic peacemaking can make clear the implications of not adhering to peacekeeping accords. Heretofore, the UN was unable to carry out peace enforcement under chapter 7 of the UN Charter, but today's disputing parties understand that this can happen much more easily and quickly.

In summary, the ability of US airpower to improve the effectiveness of military forces could make future peacekeeping operations more successful. At the same time, we must recognize that airpower is not a peacekeeping panacea and may at times have a negative influence. □

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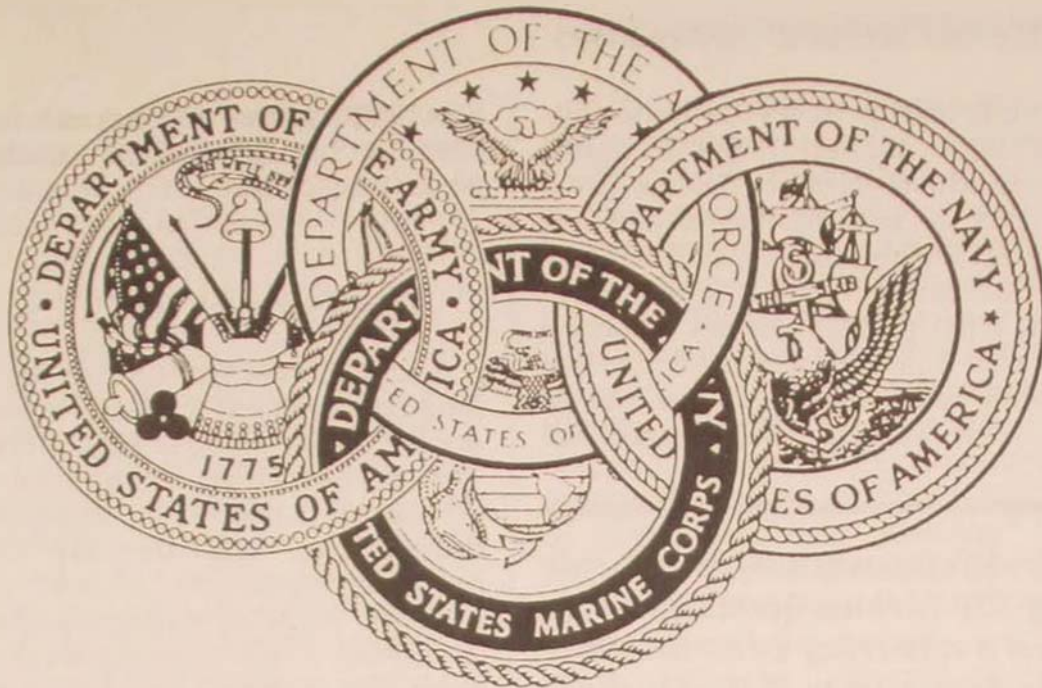
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AIR OPERATIONS MUST BE JOINT

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THE ADVENT OF airpower in the twentieth century revolutionized warfare by adding a third dimension to the "traditional" battlefields on land and sea. Further, its capabilities have evolved significantly. Initially, for example, airpower functioned as a subordinate element to the Army, and in World War I its missions included little more than aerial artillery observation and communication. Today's independent Air Force and the smaller service-unique air components, however, operate in a wide variety of combat and support roles in the joint environment. The debate over airpower's role among the various armed services has been a recurring issue since the airplane demonstrated its

utility as a weapon of war during the First World War. Interservice discussions have been widespread and intense, caused by the services' parochial self-interests and differing viewpoints on how to wage joint warfare. Specifically, the sea and ground services want airpower to operate under their control in direct support of the tactical and operational levels of their respective campaigns, while the Air Force wants to focus its assets on an independent air campaign against strategic targets in support of the theater campaign.¹

During the past seven decades, a variety of joint organizations tried to meet wartime requirements by establishing differing degrees of control over the services' air assets. Their efforts met with varying levels of success.

After noting problems in several joint military operations in the early 1980s, Congress passed the Goldwater-Nichols Defense Reorganization Act of 1986 to reform and improve the joint war-fighting capability of the services. This law gave the regional commanders in chief (CINC) primary responsibility for war fighting in their respective theaters, while subordinate land, sea, and air component commanders would control the

The debate over airpower's role among the various armed services has been a recurring issue since the airplane demonstrated its utility as a weapon of war during the First World War.

four services' components assigned to the theater. In the late 1980s, the European CINC established the joint force air component commander (JFACC) as a coordinator to organize the theater's air assets and accomplish the CINC's mission.² The Joint Chiefs of Staff (JCS) first approved this concept in Joint Publication (Pub) 26, and the other war-fighting CINCs later accepted it as a doctrinal mechanism to command and control the theater's airpower assets.³ The current concept gives the JFACC operational control over all air assets assigned or attached to the theater, along with responsibility for planning and executing air operations in support of the CINC's mission.⁴ Operations Desert Shield and Desert Storm provided the first operational, wartime exercise of the new command and control (C²) system, which proved to be the most effective system to date in commanding and controlling joint airpower.⁵ As expected with a new operating system, several questions arose, dealing with joint interoperability and service-specific concerns about the system's implementation. The lessons learned from this experience can be used to improve the cur-

rent JFACC system and enhance its performance in future conflicts involving joint power projection.

The Current JFACC System

The JFACC concept codifies the Air Force's long-held premise that (1) airpower must operate under a single air commander who exercises centralized control of air assets and (2) the execution of air missions must be decentralized. Only then can the Air Force optimize airpower's unique capabilities. Airpower assets—primarily high-performance, fixed-wing attack aircraft from the Air Force, Navy, and Marine Corps—are combined under the JFACC's operational control for the planning and execution of air operations in support of the CINC's intent for the overall theater campaign. Centralized control is exercised through the processes of apportionment, allocation, and distribution.

Apportionment consists of determining and assigning the total expected air effort (in terms of percentages and/or priorities) that should be devoted to each airpower mission (e.g., counterair [CA], air interdiction [AI], close air support [CAS], strategic attack, etc.). The CINC makes the apportionment decision, based on the JFACC's recommendation on use of available theater air assets. For example, the CINC may determine that CA is his first priority and should include 50 percent of the available air assets, based on his intent for next-day operations. His second and third priorities may be AI and CAS, including 30 percent and 20 percent of the air assets, respectively. These apportionment percentages may vary throughout the operation, depending on the enemy's air, ground, and sea capabilities and phasing of the overall theater campaign plan.

After the CINC makes the apportionment decision, the JFACC and staff conduct the allocation process, which consists of translating the apportionment percentages into numbers of sorties, broken out by available aircraft type, unit, and mission. During this

phase, they also perform mission planning for the available aircraft that support each airpower mission. This process results in the air tasking order (ATO), which provides specific mission orders for each aircraft's next-day operations. After it is approved, the ATO is sent to all services for decentralized execution of the air missions.

The distribution process takes place after the allocation process is completed. That is, the JFACC "gives" CAS sorties to the land component commander (LCC) who then distributes available sorties to subordinate Army and Marine Corps elements for use in their mission planning.⁶ Apportionment, allocation, and distribution are designed to be logical and simple, but problems stemming from differing service doctrines and equipment in Desert Storm limited the JFACC's effectiveness in implementing these three processes.

The JFACC System in Desert Storm

Overall, the JFACC system succeeded in meeting mission requirements during Desert Storm. The air campaign was a major factor in forcing Iraq to withdraw from Kuwait and in keeping coalition losses to a minimum. Because Desert Storm marked the first use of the JFACC concept, however, one could expect some problems to occur. One of the most publicized criticisms concerning joint interoperability involved the JFACC's use of an Air Force-designed ATO as a mission-planning document.⁷ Faced with planning missions for hundreds of aircraft from dozens of coalition partners, the Air Force produced a daily ATO consisting of several hundred pages. A series of courier flights then delivered the ATO from JFACC headquarters in Riyadh, Saudi Arabia, to Navy carriers at sea because communications-system incompatibility between the Air Force and Navy prevented electronic transmission of the document.

JFACC planning and execution processes encountered even harsher criticisms along service-specific lines. Indeed, some JFACC planners noted that it was sometimes easier to work with coalition members from other nations than with members of the other US services.⁸ For instance, the Navy and Marine Corps complained about the JFACC system's operational philosophy and targeting. Traditionally, the Navy's carrier air groups have operated autonomously, accustomed to decentralized control, planning, and execution of their operational missions.⁹ Similarly, Marine Corps doctrine notes that the Marine Air/Ground Task Force (MAGTF) commander retains operational control over all organic assets, including high-performance, fixed-wing aircraft.¹⁰ But the JFACC system's rigidly centralized control over target selection, planning, and decentralized execution directly opposed both the informal and formal systems of the Navy and Marine Corps. The resultant turmoil had to be overcome through improvisation.¹¹ Another criticism charged that the Air Force-dominated JFACC staff allocated Air Force assets to attack more lucrative (and highly visible) targets but relegated Navy and Marine Corps aircraft to less valuable targets.¹² However, postconflict studies have shown that many Navy and Marine Corps aircraft simply lacked adequate target identification systems as well as the capability to deliver precision guided munitions (PGM) and thus were not suitable for certain targets.¹³

The major criticism of the Army and Marine Corps concerned the lack of air effort in support of ground operations in the overall theater campaign plan. Conversely, the major complaint of the Air Force senior leadership was that preparation for ground operations diverted assets from the strategic effort.¹⁴ During the air campaign's initial phases, the JFACC concentrated assets on strategic attack to wrest air superiority from Iraq and to eliminate its command, control, communications, and intelligence (C³I) facilities and nuclear, biological, and chemical (NBC) capability, in accordance with the

CINC's apportionment decision. As the air campaign progressed, the CINC intended to shift the focus to interdiction sorties against Iraqi ground forces for the upcoming ground war to liberate Kuwait. However, senior JFACC staff planners diverted interdiction strikes nominated by the Army to strategic targets, an action that countered the CINC's intent for the overall campaign.¹⁵ Air Force commanders and planners felt that diverting aircraft from the strategic effort prevented the air campaign from decisively defeating Iraq without the need for a ground war.¹⁶ But Army and Marine LCCs were not convinced that airpower alone could force Iraq to withdraw from Kuwait. They felt that although the ground campaign would still be required, the JFACC did not support the "shaping" of the ground battlefield until directly pressed by the CINC.¹⁷ For example, airpower struck only one-third of over 3,067 Army-nominated ground targets in preparation for ground operations.¹⁸ At the beginning of the air campaign, the MAGTF commander withheld half of his organic, fixed-wing assets from JFACC control, saving them for his priority targets.¹⁹ Later in the air campaign when the JFACC had not allocated "sufficient assets," the MAGTF commander withdrew all of his fixed-wing aircraft from JFACC control to shape the bat-

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

—Gen Curtis LeMay

tlefield in accordance with his intent.²⁰ Although this action solved the MAGTF's near-term problem, it defeated the purpose of using a JFACC to optimize the use of air assets. Neither does it offer long-term, workable solutions to problems with air-

ground operations. We need to find better solutions, and this process begins with understanding the major doctrinal differences among land, air, and sea forces.

Doctrinal Differences

Gen Curtis LeMay noted that "at the very heart of warfare lies doctrine. It represents the central beliefs for waging war in order to achieve victory."²¹ But the four services differ in their respective war-fighting doctrines and in their perception of warfare and airpower's role in it. These differences became especially evident during Desert Storm. For example, the JFACC staff was joint in name only, since its nucleus consisted of the Ninth Air Force staff, augmented by other Air Force elements and liaison officers from the other services and nations that supplied airpower assets.²² Unsurprisingly, Air Force doctrine dominated the JFACC planning process,²³ focusing on CA operations and strategic attacks, regardless of the other services' concerns.²⁴ Airpower advocates from the time of Giulio Douhet through the present day believe that the heart of the enemy's ability to wage war (its strategic center of gravity) lies in his industrial base.²⁵ After achieving air superiority, the Air Force then launches a strategic attack aimed at destroying the enemy's industrial infrastructure and achieving decisive results without intervention by land and sea services. In essence, Air Force doctrine makes support of ground (or naval) forces a low-priority mission for air combat units.²⁶ Thus, the JFACC staff's recommendations for aircraft apportionment to the CINC followed the dictates of Air Force doctrine, which preferred to handle operational-level ground targets with AI rather than CAS.²⁷

On the other side of the doctrinal coin, the Army, Marine Corps, and Navy see themselves as the final arbiters of armed conflict in their respective environments. To them, airpower plays only a supporting role, merely augmenting available firepower and

limiting hostile fire on friendly forces. Unlike the Air Force, the advocates of land and sea power consider the enemy's strategic center of gravity to be his army and navy, respectively; thus, available airland and sea resources should concentrate on the opposing center of gravity to fulfill the campaign's objectives.²⁸ Naval and military strategists such as Carl von Clausewitz, Antoine de Jomini, Alfred Thayer Mahan, and Julian Stafford Corbett all agree that occupation of the enemy's territory offers the decisive solution to combat. This viewpoint is best summarized in the Naval War College's classic text of 1942, *Sound Military Decision*: "The final outcome [of war] is dependent . . . on ability to isolate, occupy, or otherwise control the territory of the enemy" (emphasis in original).²⁹ In Desert Storm, the UN and US objective of liberating Kuwait did require a land campaign entailing ejection of Iraqi forces and occupation of the land.³⁰ Such doctrinal differences over the role of airpower in support of the theater campaign plan made disputes among the services almost inevitable.

Joint Interoperability and the Need for Joint Doctrine

Many joint interoperability problems with hardware are undergoing research and development for possible solutions. The Navy and Marine Corps still need to enhance their air capability to influence the land campaign in accordance with their recently published white paper . . . *From the Sea*,³¹ which shifts the Navy's traditional focus from a blue-water, fleet-on-fleet confrontation to support of joint-force projection operations in the littoral regions of the globe. For example, the Navy and Marine Corps need more aircraft with the capability to deliver PGMs and with advanced target identification systems compatible with current Air Force systems. Each service should

procure equipment—especially communications and weapons systems—that is compatible with that used by the other services. Several joint communications, electronics, and systems boards have already been estab-

Many of our current problems over the uses of the various Armed Services stem from a lack of coherent doctrine on how they should be used individually and collectively in an operational campaign to secure some strategic end. This problem . . . applies not only to joint air doctrine but also to joint war-fighting doctrine in general.

lished to ensure the compatibility of new common-use hardware, software, and other equipment. Increased peacetime training of Air Force, Navy, and Marine aviators in JFACC procedures will also improve operational effectiveness of the new system. Further, the ongoing joint training opportunities through the reorganized US Atlantic Command (USACOM) will improve joint interoperability by establishing common procedures and knowledge in all four services.

Many service-specific complaints are not yet solved and will remain unsolved until the four services agree on joint war-fighting doctrine. Instances of the lack of adherence to established joint doctrine, such as the Marine Corps's withholding of air assets from JFACC control, limit the amount of interoperability that can be developed among the services. Col John A. Warden III, the architect of Desert Storm's air campaign, notes that "many of our current problems over the uses of the various Armed Services stem from a lack of coherent doctrine on how they should be used individually and collec-

tively in an operational campaign to secure some strategic end" (emphasis added).³² This problem—which applies not only to joint air doctrine but also to joint war-fighting doctrine in general—is both systemic and historical and will continue as long as the services continue to operate under separate doctrines.

The Department of Defense (DOD) has several independently developed doctrines: the Army's AirLand Battle, the Navy and Marine Corps's . . . *From the Sea*, and the Air Force's global reach—global power, all dealing with the projection of joint expeditionary forces but otherwise exhibiting precious little that links them together for a common purpose. None of the current service doctrines goes far enough in supporting joint operations because none fully integrates the capabilities of the others. As noted above, Air Force doctrine minimizes support to the joint airland campaign, while Navy operating philosophy and Marine Corps doctrine oppose the centralized control of joint air efforts through the JFACC. Instead of main-

Instead of maintaining independent (sometimes opposing) doctrines, we need to write one joint doctrine to guide the projection of joint air, land, and sea power.

taining independent (sometimes opposing) doctrines, we need to write one joint doctrine to guide the projection of joint air, land, and sea power with one "central [belief] for waging war in order to achieve victory" (to reiterate General LeMay's point) and then develop service doctrines that support joint power projection. This war-fighting joint doctrine should be developed at the new Joint Warfighting Center at Fort Monroe in Hampton, Virginia, under the

guidance of the JCS³³ and should be sufficiently broad and flexible to allow each service to produce a supporting doctrine that takes advantage of its unique capabilities and characteristics. Conversely, no service should develop a doctrine that opposes the effective development and execution of joint doctrine and operations in future endeavors.

Refinements to the JFACC System

The current JFACC system is an effective mechanism for controlling joint airpower but could stand some refinements. For instance, future JFACC staffs should be truly joint, including equal representation from the four services. Gen William W. Momyer noted that "when a headquarters that is supposed to control multiservice forces is not structured with a balanced staff, inter-service problems tend to become magnified since there is inadequate consideration of at least one service's view at the outset."³⁴ The JFACC staff—particularly the operations and planning cells—should include enough Army, Navy, and Marine Corps representatives to ensure that the concerns of each service are addressed in the apportionment and allocation processes. The staff planning processes should use established joint doctrine instead of service-specific doctrine or theories that limit the effective execution of joint air operations in-theater. In other words, JFACC staff members should not subvert the staff planning process or the CINC's allocation decision, as was the case in the Gulf War when several Air Force members of the JFACC staff used "creative diversions" to divert tactical strikes from Kuwait to strategic targets in Iraq in an attempt to validate the prewar claim that airpower can defeat enemy land forces without using friendly land or sea forces.³⁵ On the other hand, the demands of ground commanders should not dilute the CA effort to the point of failure, unless the tactical situation on the ground

dictates otherwise. The responsibility for maintaining this delicate balance between competing demands for airpower falls squarely on the shoulders of the JFACC and his or her staff. Once the CINC makes the apportionment decision, the allocation of aircraft must fulfill the CINC's original intent, and no aircraft should be diverted to other targets unless unanticipated changes in the theater situation so dictate. If diversions occur, then one should make appropriate modifications to the ATO to fulfill the CINC's apportionment decision and his or her intent for subsequent phases of the theater campaign.

Army, Marine Corps, and Navy leadership must understand the strategic, operational, and tactical roles of airpower in the theater air campaign. Because airpower is a scarce resource on the battlefield, it may not be available for every potential target. Wartime experience has shown that AI makes more effective use of limited air assets than does CAS and that higher-priority missions in accordance with the CINC's intent may limit the number of sorties providing direct mission support to ground and sea forces.³⁶ Thus, local commanders should be prepared to adjust their operational plans accordingly if planned and requested CAS sorties are not available. On the other hand, Air Force, Navy, and Marine air components need to be aware of their roles in supporting ground and sea forces on the modern battlefield. Because airpower is a tremendous force multiplier for land and sea forces, commanders should frequently use it to increase US military effectiveness and to reduce friendly casualties.

The services must develop improved joint education so their members can understand the capabilities and limitations of airpower in its strategic, operational, and tactical roles in the theater campaign. This education should cover the role of the JFACC in supporting the CINC's theater campaign plan and the way airpower can best support each phase of the campaign in the air, on land, and at sea. Planners and operators in the

joint environment must learn when and how to adapt service-specific doctrine and concerns to meet the requirements of joint operations in power projection and not allow parochial interests to override the needs of the joint operation.

The first priority of joint air operations in support of the theater campaign must be CA operations to achieve air superiority because wartime experience has shown that air, land, and sea forces cannot effectively perform their missions while under air attack.³⁷ Joint US airpower has done a superb job of ensuring air superiority to support US ground and sea forces—witness the fact that these forces have not faced a hostile aerial attack since 30 June 1953, during the Korean War.³⁸ After air assets have established air superiority, the CINC can then apportion those assets among all sea, air, and land forces in-theater to meet other service and mission requirements and to ensure accomplishment of the CINC's mission. With regard to other priorities, Adm James Winnefeld notes that "the first priority [for airpower] should be the needs of the supported commander *if a decisive engagement is under way*. . . . The second priority should be the requirements of the air component commander. This order of priorities should be reversed if the supported commander is not decisively engaged or about to engage" (emphasis in original).³⁹ When ground and sea forces are not in use or not in-theater, the CA and strategic campaigns should have priority on available assets because, as some sources argue, the JFACC is the supported commander.⁴⁰ However, after ground and sea forces are committed or intended for use in the theater campaign plan, sufficient air assets must be apportioned and allocated to meet the supported commander's AI and CAS requirements, in accordance with the CINC's intent. If time permits, subordinate air, land, and sea commanders should be informed of the apportionment and allocation decisions (along with any subsequent changes) in order to increase their understanding of the CINC's intent and campaign

plans and to allow them to adjust their supporting plans accordingly.

Conclusions

The JFACC system is the most effective joint organization that DOD has devised to command and control joint air operations. Nevertheless, we must refine the system to make it more responsive to the requirements of the CINC and the subordinate commanders of all four services. Air operations must be *joint*—not merely an amalgamation of individual service efforts operating in accordance with individual service concerns and agendas. Joint operations are the primary means by which the US will project power abroad in the new world order. Indeed, Gen

Henry C. Stackpole III predicted that the US will probably never witness a military operation that is neither joint nor combined.⁴¹ In the past, each service followed an independent doctrine based on its own interests. Although such doctrine allowed for some degree of overlap when the services worked together in joint operations, in the future we may not have the luxury of redundant capabilities and must make more effective use of available forces. Because joint air operations will prove invaluable to power projection in future conflicts, we must develop the joint doctrine, equipment, and procedures to support the JFACC system. Only then can we use it more effectively and efficiently to project force against hostile land-, air-, or sea-based threats. □

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Ricochets*continued from page 3*

Excellent article! Captain Barco's insights and understanding of leadership and "quality" are, in my opinion, absolutely correct and very timely. The conclusions he's developed need to be fully understood, appreciated, and integrated into the thinking and actions of our senior leadership, of which I'm a member. I will certainly do what I can in my leadership positions, as well as to be personally involved in influencing my peers and seniors.

One area particularly concerns me. I understand effort is under way to develop and publish a regulation on "quality implementation." The inappropriateness of this is obvious and obviously supported by Captain Barco's research and conclusions. The value of a quality-oriented philosophy in leading and managing today's organizations is well documented, but most have failed during bureaucratic approaches to implementation in large part due to the points made by Captain Barco.

I suggest that those in senior leadership positions and those others that aspire to those positions must integrate the thinking and conclusions

in Captain Barco's article into their approach to leadership and the implementation of quality concepts in the Air Force.

Maj Gen Frank D. Watson, USAFR
Washington, D.C.

The Author Responds

I share General Watson's deep concern regarding any future regulation on "quality implementation." In a quality culture, enlightened leadership—not regulation—defines the vision, sets the goals for the journey, and establishes any needed boundaries along the way.

History provides ample evidence that regulation impacts a leader's ability to freely innovate, think, and ultimately lead. For quality to flourish, creative and aggressive "systems thinking" must replace our addiction to the comfortable bureaucracy of yesterday. It's a shame. What S. L. A. Marshall said 40 years ago may still hold true in some shadowed pockets of the USAF: What we learn from history is that we simply do not learn from history!

Maj Charles T. Barco, USAF
Maxwell AFB, Alabama

COMMENT CARDS**SITUATIONAL LEADERSHIP MODEL**

Great article on leadership ("A Situational Leadership Model for Military Leaders," Fall 1994). However, figure 10 (page 41) is conceptually flawed. Failing deterrence, the policy staff and operations should be concerned with an eclectic measure of military merit such as probability of kill, avoidance of collateral damage, cost, and avoidance (risk of), inter alia, depending on the situation. Sorties are a metric of mass. Maneuver and economy of force must also be considered.

Lt Col Larry Feltes, USAFR, Retired
West Chicago, Illinois

The Author Responds

Good point. All models are simplifications and as such may mislead. My intent was to suggest

that the mission, outcome, or product of a staff is different from the product of an operational unit and may require the leader to adjust his or her leadership style. I would suggest that, generally speaking, staffs concern themselves with producing policy and plans, whereas operational units produce an activity. The activity I gave as an example was sorties. It could have been bombs on target, terrain occupied, or short tons moved to a forward location.

Col Don Waddell, USAF
Maxwell AFB, Alabama

CHAOS THEORY

It sounds as though the authors of "What Does Chaos Theory Mean for Warfare?" (Fall 1994) are

saying that chaos theory *could* allow for realistic simulations with the variations they prescribe. Ignoring the commercial computer war games, I know personally that advanced board war games have had those uncertainties/start variations/prescriptions mentioned for 15 years.

TSgt John E. Michalski, USAF
Oklahoma City, Oklahoma

SPECIAL EDITION 1994

I usually look forward to the arrival of a new *Airpower Journal*. The Special Edition 1994 was very disappointing. Stick to your niche! We need a professional journal for discussion of airpower issues at the operational level of war.

Lt Col Stetson M. Siler, USAF
Edwards AFB, California

EDITOR'S NOTE: *Sorry about the disappointment. Strongly agree with your last sentence—that won't change. Read my editorial on page 2 of this issue. Sticking to our "niche" has stifled debate on substantive issues related to airpower, alienated some of our readership, turned away quality authors, reduced our publishing load, quieted the professional dialogue, brightened fireplaces in homes across the country, and failed to evoke comment from Rush Limbaugh on anything—in short, chaos theory by another name.*

Excepting Mr Limbaugh, we're changing all of that. JWS

I feel that the Special Edition 1994 was an excellent volume. Something like this could be done perhaps twice a year. I found it most informative.

Lt Col James D. Stevens, USAF
Wichita, Kansas

ELECTRONIC MEDIA

When will *Airpower Journal* be available electronically? I suggest America Online or the DOD Tectnet.

Lt William O. Glascoe III, USAF
Sunnyvale, California

EDITOR'S NOTE: *Glad you asked! We're working on getting our own page on the Internet with data access via the World Wide Web (WWW). The interface will be a hypertext page of text and graphics with cross-links that you can select. The links will send you to other hypertext pages, indexes of information on particular airpower subjects, text files, graphics, etc. The possibilities are endless! We'll provide more information as it becomes available and keep you (our readers) apprised of our progress.* JMP



Winter 1994

IRA C. EAKER AWARD WINNER



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1st Lt John T. Dillaplain, USAF

for their article

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Congratulations to Capt Edward P. O'Connell and 1st Lt John T. Dillaplain on their selection as the Ira C. Eaker Award winners for the best eligible article from the Winter 1994 issue of the *Airpower Journal*. Captain O'Connell and Lieutenant Dillaplain receive a \$500 cash award for their contribution to the Air Force's professional dialogue. The award honors Gen Ira C. Eaker and is made possible through the support of the Arthur G. B. Metcalf Foundation of Winchester, Massachusetts.

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Reading is to the mind what exercise is to the body.

—Sir Richard Steele

Airpower: A Centennial Appraisal by Air Vice-Marshal Tony Mason. Brassey's, 33 John Street, London WC1N2AT (distributed in the US by Macmillan Publishing Co., 201 West 103d Street, Indianapolis, Indiana 46290), 1994, 320 pages, \$40.00.

Where is airpower going as it enters its second century? What can it offer governments at the end of the East-West confrontation and during the reemergence in the early 1990s of strategic unpredictability and uncertainty? *Airpower: A Centennial Appraisal* is the first book-length attempt to answer these sticky questions. Written by the preeminent British airpower expert, retired air vice-marshal Tony Mason, it is a study of the role of airpower in today's uncertain international environment, and it suggests how airpower can provide relevance and the ability to secure the political objectives of governmental leadership.

This seminal work provides an in-depth probe of airpower in the last years of the NATO-Warsaw Treaty Organization confrontation, the process of conventional arms limitation, the Gulf War, the process of peacekeeping, the disintegration of the Soviet air force, and the beginnings of the Russian air force's reconstitution; it also examines airpower's role as it begins its second century. The significance of these events for airpower's second century is first put into context through an examination of certain specific topics garnered from airpower's first century. The air vice-marshal feels there is a very real danger in the 1990s that debates about airpower may be threatened by a reemergence of zealotry and obtuseness as services face reductions in resources, diminished threats, and a blurring of roles. Now is the time to analyze airpower not only in terms of its unique characteristics but in the context of warfare as a whole.

The first two chapters unabashedly use hindsight to analyze airpower in its infancy and its growth through World War II from a peripheral through pervasive to dominant national instrument. The section closes with an examination of the Arab-Israeli conflict, in which—the author argues—airpower really did dominate because it was in total harmony with the strategic environment. The author then looks at how “it was air power which strongly influenced the nature of East-West confrontation, rather than the converse.” The question of how airpower can contribute to arms control comes in for scrutiny through the example of the course of the conventional arms control treaty, signed in the early 1990s. Next, Mason turns to several questions: Was the Gulf War unique? Did it set a precedent? What lessons and conclusions can be drawn from this 1991 apotheosis of airpower? If the Gulf War did set a precedent, then what are the constraints, possibilities, and implications for airpower in the peacekeeping environment? The question of Russia, the impact of the Gulf War, the disintegration of the USSR, and the new doctrinal framework that has been developing over the last two years all come in for review. The final chapter is devoted to what is termed the “era of differential airpower.” Many readers may well find their cherished notions challenged by the argument that on the “threshold of its second century,” airpower is now “an integral component of warfare.”

Airpower: A Centennial Appraisal is an excellent discussion of airpower and its role for the future. Although the reader will disagree with some sections, the book is intended to be thought-provoking rather than divisive. However, readers from the land and sea services may well become incensed with some of Mason's conclusions. For example, he points out that—although during the Gulf War, corps commanders complained of the lack of air support—it was the theater commander who directed that air priorities be concentrated elsewhere. According to Mason, this situation clearly shows the problem

inherent in AirLand Battle doctrine (and in most Army-Air Force combined efforts). Ground-force operations are implemented at the corps level, while airpower assets—given their flexibility and radius of action—are coordinated at the theater level. He also argues that even with the success of Desert Storm, AirLand Battle is still an unproven doctrine in the mid-1990s.

Continuing a discussion of the Gulf War and the aircraft carrier, Mason concludes that the simultaneous, parallel operations that characterized airpower's operations in that conflict are probably beyond the scope of the carrier task forces. Further, discussions concerning the effectiveness of carrier-based versus land-based airpower should be based on productivity rather than costs, in light of the carrier's vulnerability to mines, air attack, and shore-to-ship missiles, as well as constraints on the carrier's range, payload, and scale of offensive operations. Mason concludes that the "carrier is now primarily a 'small-war' instrument."

The book also argues that "there is sufficient circumstantial evidence to suggest that [airpower in the Gulf War] proved that it could substitute for land power." Regardless of these arguments, the closing sentence is perhaps the most important in the entire volume: "Air forces must harmonize their equipment with their doctrine but keep their vision far into the future."

As an airpower historian and doctrine analyst, I cannot stress enough my conviction that all airpower advocates must read this book. All readers will not agree with Air Vice-Marshal Mason's conclusions, but they will agree that those conclusions provide plenty of material for thought. *Airpower: A Centennial Appraisal* is a must read.

Maj Michael J. Petersen, USAF
Maxwell AFB, Alabama

Joint Military Operations: A Short History by Roger A. Beaumont. Greenwood Press, 88 Post Road West, Box 5007, Westport Connecticut 06881, 1993, 264 pages, \$55.00.

Joint Military Operations is a concise and informative review of 3,000 years of joint warfare. Throughout this book, Beaumont weaves the themes of unity of command, friction, interservice rivalry, doctrine, training, and the role of leadership to support his main thesis: successful joint warfare has been practiced numerous times since the age of Rome, but many nations continue to relearn these lessons the hard way.

In the first chapter, Beaumont deftly summarizes joint warfare from antiquity up to World War I. Greek and Roman amphibious operations are described as the best examples of early jointness. He then discusses British and American joint operations during the Revolutionary War (joint warfare was utilized routinely but with few major successes) and the Civil War (successful joint operations were the result of personalities meshing instead of established doctrine) as well as the disarray of joint warfare during the Spanish-American War (one of many examples of how quickly joint lessons are lost, only to be relearned with much loss of blood).

Entire chapters are devoted to World War I, the interwar years, World War II, and the postwar era up to and including Desert Storm. Each topic adequately describes how the formula for successful joint warfare is quickly forgotten throughout history, only to be learned again later.

Beaumont's chapter on World War I concentrates on the failure of jointness in the famous Gallipoli campaign of 1915 and the introduction of airpower into the joint equation. While Gallipoli's failure was attributed to poor planning and inadequate joint doctrine, the one bright spot was close air support. However, the author concludes this section on World War I with the statement that "joint operations were seen to be well off to the side of the turbulent mainstream of war" (page 60).

The chapter "Between the Wars" is equally grim in describing how jointness was a distant concern to most nations. Much time is spent discussing the interservice rivalry over the use and control of airpower and the way close air support became a "third priority" for the Army Air Corps. This lack of concern for joint operations manifested itself in a long learning curve for most nations early in World War II.

The British and Americans in particular entered World War II with little preparation for joint warfare, but once again necessity forced them to relearn the fundamentals quickly. Beaumont comments that "from mid-1940 to the spring of 1942, jointness suffered from uneven operational skill and experience; from the skepticism of many commanders, staff officers, and civil servants; and from delays, setbacks, and runs of bad luck" (page 87). However, he points out how the Allied skills in jointness were improved through numerous operations as the war progressed. Operation Overlord is the epitome of effective joint warfare, although too little time is spent on this major operation. Again, after the

war, joint operations fade away as the US becomes dependent upon nuclear weapons and one service to carry out deterrence—the Air Force.

Perhaps the weakest part of *Joint Military Operations* is the chapter that deals with jointness from 1943 to 1991. Although the author discusses a vast amount of material, the discussion is sometimes superficial—especially the part dealing with Desert Shield/Storm.

Beaumont's final chapter "The Central Problem of Friction," wraps up many of his common themes that explain problems in joint operations. These problems include clashes of personalities, interservice rivalry, reduced funding, bureaucratic politics, little unity of command, basic human "tribal" impulses, and—of course—friction. The book closes with an appropriate quote: "The history of joint operations shows

how often what was done was not all that could have been done, and how the price of tinkering and leaving matters to fate was often far higher than expected" (page 194).

Joint Military Operations is a very informative, fact-filled, and readable account of the advances and setbacks in joint warfare since the Roman Empire. Although a bit lacking in examples of modern joint warfare—especially Desert Storm—this book should be required reading at all US war colleges. As course director of the only undergraduate core course in joint operations in the US, I highly recommend *Joint Military Operations*—so much so that all instructors who teach this course at the Air Force Academy will be getting copies soon.

Capt Phil Bossert, USAF
USAF Academy, Colorado

Mission Debrief

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The Editor

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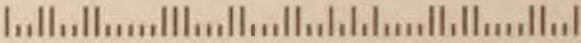
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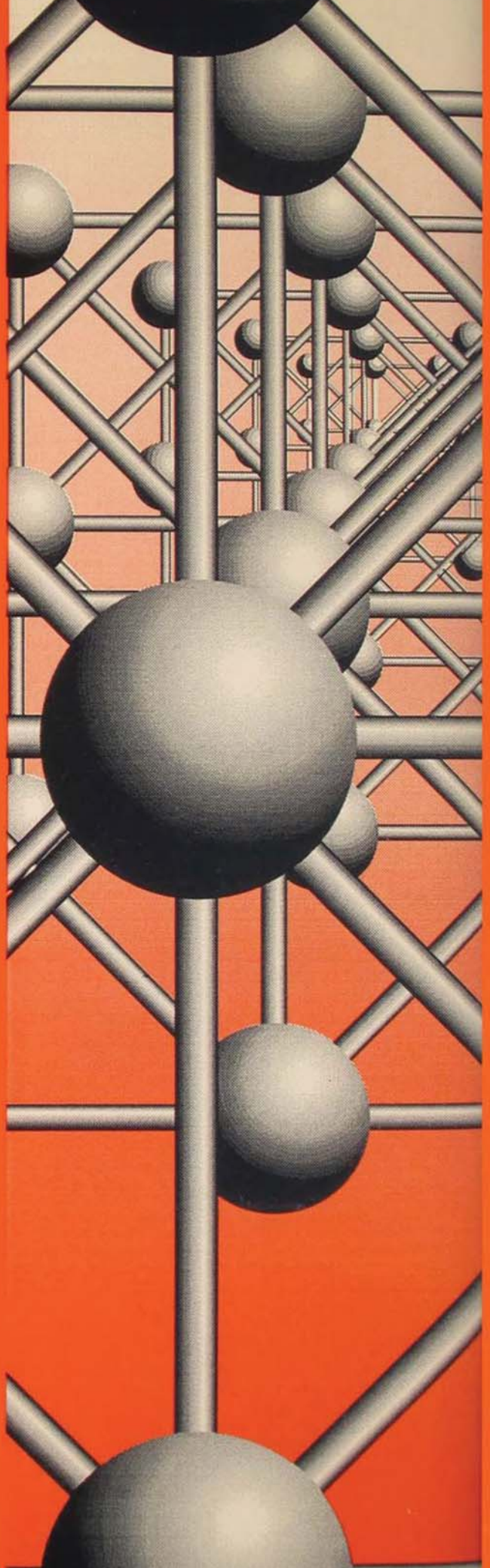
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