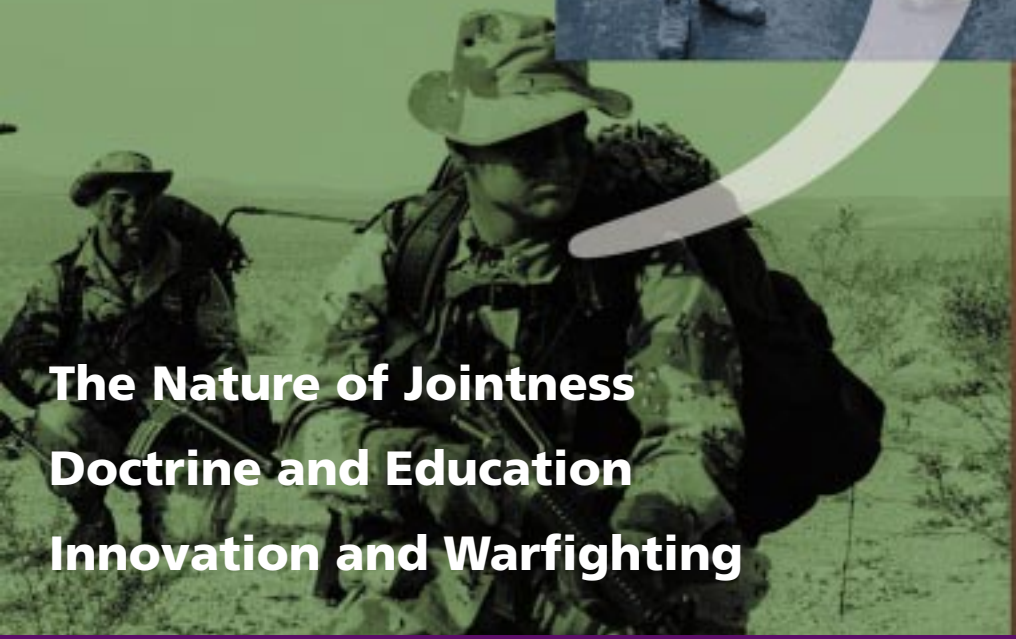
JOINT FORCE QUARTERLY

JFQ





5TH ANNIVERSARY ISSUE

The Nature of Jointness

Doctrine and Education

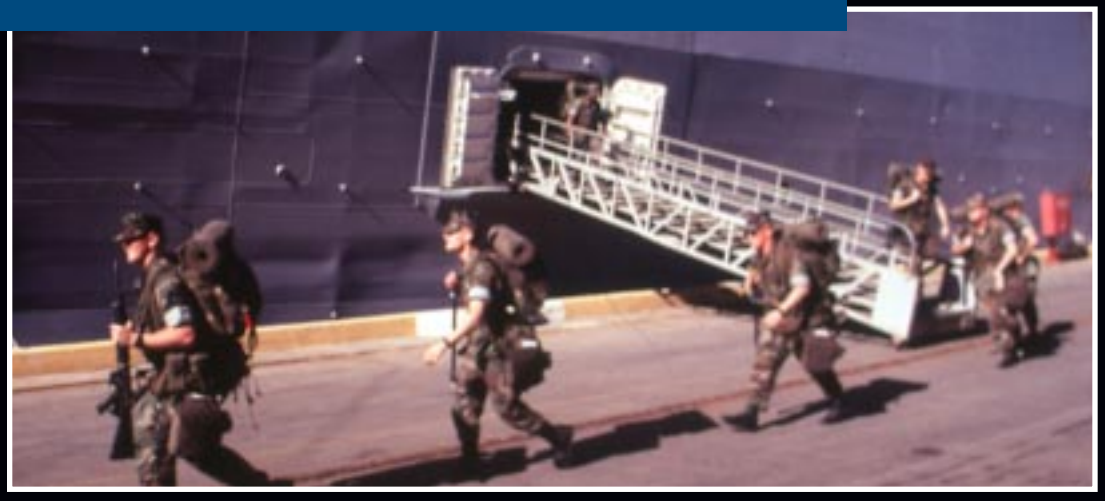
Innovation and Warfighting

Summer 98

A PROFESSIONAL MILITARY JOURNAL

. . . to spread the word about our team, to provide for a free give-and-take of ideas among a wide range of people from every corner of the military.

—Colin L. Powell on the purpose of *JFQ* in the inaugural issue (Summer 1993)



JFQ

A Word from the Chairman

Of the many changes I have witnessed during my career, the most significant in terms of warfighting has been the increased ability of the Armed Forces to work together. There is no doubt that there has been tremendous progress in synchronizing operations on land, at sea, and in air and space. However, despite strides in organizing, training, and equipping for joint operations, there is still important work to do to create a truly integrated joint force.

Efforts toward jointness are essential given the challenges of the future. Although the United States will probably not face a hostile superpower in the near term, the world will remain a dangerous place. The nation-state, along with armies, navies, and air forces as we know them today, will remain for a long time, and the Armed Forces must be ready to defeat any foe equipped with conventional military capabilities. At the same time, these forces will certainly face adversaries who will challenge America's interests asymmetrically, using state-of-the-art technology and, perhaps more frightening, weapons of mass destruction.

for the past five years *Joint Force Quarterly* has been *the* journal of the joint warfighter

Meeting these challenges depends on making the right preparations now. In very real and tangible ways, the successes of our joint force were made possible by the past efforts of thousands of Americans in the Armed Forces. Likewise, those who will follow us will rely on our dedication and hard work to prepare them for the future. Developing the best force for the Nation requires rigorous analysis about important choices concerning new equipment, organizations, training, and doctrine.

Critical thinking about joint warfare takes place in different quarters of the military, but for the past five years *Joint Force Quarterly* has been *the* journal of the joint warfighter. *JFQ* provides an open forum where ideas and concepts about joint warfare can be proposed, debated, and refined. As General Colin Powell noted in the inaugural issue, the purpose of the journal is "to spread the word about our team, to provide for a free give-and-take of ideas among a wide range of people from every corner of the military." It has done precisely that, furnishing an arena for debate among officers from every service and of all grades, as well as civilian defense analysts from this country and abroad.

Collectively, the articles which have appeared in *JFQ* over the last five years have presented a profusion of original ideas. Some pieces have shaped operational concepts while others have explored the impact of change on doctrine, organization, and technology.

This issue offers a look back at the best of *JFQ*. The opening section discusses the nature of jointness itself. No nation has had more experience in conducting joint operations than the United States. Yet since the first extensive test of joint operations during World War II, we have

(continued on page 4)

JFQ

PHOTO CREDITS

The collage on the cover incorporates photographs from eight previous issues that feature (clockwise from top right) amphibious assault vehicles in Kuwait (U.S. Marine Corps/Michael J. Anglin), issue 10 (Winter 95–96); C–17 over Fort Sumter (U.S. Air Force/Dave McLeod), issue 6 (Autumn/Winter 94–95); *USS Dwight D. Eisenhower* transitting Suez Canal during Desert Shield (U.S. Navy/Frank A. Marquart), issue 1 (Summer 93); marines emplacing sensor during Advance Warfighting Experiment (U.S. Marine Corps/Christopher S. Cline), issue 15 (Spring 97); F–117 refueling (U.S. Air Force/Val Gempis), issue 11 (Spring 96); *USS Kentucky* (U.S. Navy/F.E. Zip Zimmerman), issue 12 (Summer 96); Apache (McDonnell Douglas), issue 9 (Autumn 95); and (centered) soldiers of 325th Airborne outside Tuzla Air Base (U.S. Army/Larry Lane), issue 13 (Autumn 96). The front inside cover shows flight deck crew rigging barricade (U.S. Navy/Nathan Curtis), navigators plotting course (U.S. Air Force/Paul Caron), Ranger patrolling in Haiti (U.S. Army/Greg Scott), and marines disembarking at Guantanamo Bay (U.S. Air Force/Vince Jones). The photo at right features joint officers (U.S. Navy/Jeffrey Viano). The back inside cover captures F–16C at air base in Jordan (U.S. Air Force/Paul R. Caron). The back cover features members of 10th Mountain Division at CENTRAZBAT '98 (1st Combat Camera Squadron/Lemuel Casillas); Marine F/A–18Cs aboard *USS Enterprise*, COMPTUEX '98 (U.S. Navy/Timothy S. Smith), *USS Jarrett* in Persian Gulf during Southern Watch (U.S. Navy/Daniel J. Quinajon), and C–130 at Pope Air Force Base (4th Combat Camera Squadron/Melissa M. Mondares).

This special fifth anniversary issue of *Joint Force Quarterly* presents a selection of articles previously published in the journal. Since the appearance of the inaugural issue in Summer 1993, over 350 authors have contributed a wide range of feature articles, essays, and reviews (see index, pp. 130–141). The contributions reprinted herein thus represent only a small fraction of a diverse, growing body of periodical literature dedicated to fostering joint culture within the Armed Forces. No attempt has been made to update or otherwise amend the articles in this issue. Similarly, the biographical details accompanying them reflect the rank or position of the authors at the time the articles were originally published. All contributions are reproduced with original pagination and issue markings at the bottom corner of each folio. However, a ring folio (8) has been added at the bottom center which corresponds to the page numbers in the table of contents. JFQ

Joint Force Quarterly

Hans Binnendijk
Director
Institute for National Strategic Studies
Editor-in-Chief

Robert A. Silano
Director of Publications
Institute for National Strategic Studies
Editor

Martin J. Peters, Jr.
Production Coordinator

William A. Rawley
U.S. Government Printing Office
Art Director

Calvin B. Kelley
Copy Editor

Editor, *Joint Force Quarterly*
ATTN: NDU–NSS–JFQ
300 Fifth Avenue (Bldg. 62)
Fort Lesley J. McNair
Washington, D.C. 20319–5066

Telephone: (202) 685–4220 / DSN 325–4220
Fax: (202) 685–4219 / DSN 325–4219
e-mail: JFQ1@ndu.edu
Internet: **http://www.dtic.mil/doctrine**

ISSN 1070–0692

August 1998

(continued from page 1)

struggled with the notion of jointness. What is it? What are its limitations? More importantly, will the concept of jointness change in the future? Articles found under the heading of "The Nature of Jointness" tackle these questions head on.

Doctrine and professional education underpin every dimension of jointness. They are the mechanisms for conveying new ideas to our warfighters and are essential for translating our vision of future joint warfighting into reality. The section entitled "Doctrine and Education" addresses how joint doctrine and joint education should be revised to handle the diverse and daunting challenges of the 21st century.

One of the formidable tasks ahead is coping with technological change. How we employ technological breakthroughs can be as critical as developing the technology in the first place. Indeed, history is filled with examples of militaries that did not make the most of the technology they possessed because they held onto outmoded organizational concepts. This problem is the focus of articles in the section entitled "Innovation and Warfighting."

Two further contributions are reprinted in this issue. "The Chairman as Principal Military Advisor," an interview with General Powell, offers unique insight into the development of jointness in the wake of the Goldwater-Nichols Act. And in "Keeping the Strategic Flame," the late Carl Builder examines the American approach to war in search of enduring ideas for victory.

The articles in this edition were not selected because they present "approved solutions." Instead they offer excellent examples of well-written and insightful arguments that inspire critical thinking about the profession of arms. I am encouraged by the spirited dialogue displayed in these pieces. This is the type of debate we need to help us gain a better understanding of joint capabilities for today and tomorrow. I look forward to many more years of thought-provoking articles in the pages of *JFQ*.

HENRY H. SHELTON
Chairman
of the Joint Chiefs of Staff

U.S. Navy (David Blencoe)

The Nature of Jointness

Jointness is at its strongest in the face of an enemy, and its foundations were laid during World War II. David Armstrong makes this argument in "Jointness and the Impact of the War." In "What Exactly Is Jointness?" Lawrence Wilkerson then picks up where Armstrong leaves off. Jointness is forged the same way as the bonds of combat—"in the cauldron of shared dangers, decisions, and death." It is also built on proficiency in one's own service capabilities. Without such an appreciation there can be no trust and understanding.

How understanding is developed in joint operations is at the heart of "Joint Warfare and the Army-Air Force Team," by Dennis Reimer and Ronald Fogleman. These service chiefs address cooperation in what has historically been the most contentious aspect of joint warfare, air-ground operations. They work through many of the difficult issues that have arisen in combat.

William Owens examines how interservice cooperation might be viewed to the benefit of all. In his article "Living Jointness," he writes that the service components should be enablers whenever possible. That is, they "ought to operate continually with the purpose of aiding and facilitating operations of the other service components that will be involved in conflict."

Jointness has bounds, as Seth Cropsey reminds us in "The Limits of Jointness." It must strike a careful balance, particularly in peacetime. On the one hand, it must emphasize a concerted operational effort. On the other, it must not suppress debate over such fundamental issues as the composition and character of future forces.

In the final article, Frederick Strain goes where few have gone before in his article "The New Joint Warfare." He examines what joint warfare will mean in the future. As he observes, "The ability to conduct simultaneous operations across the depth, breadth, and height of the combat area compels professionals to change their perspective." JFQ

The Battle for Fox Green Beach by Dwight C. Shepler.

U.S. Navy

Jointness and the Impact of the War

By DAVID A. ARMSTRONG

As General Colin L. Powell noted two years ago in introducing the inaugural issue of *JFQ*, the experience of World War II provided a foundation for jointness. Operations during the war clearly and repeatedly demonstrated the advantages of jointness and the penalties for failing to achieve it. At war's end, the Joint Chiefs of Staff supported jointness in principle.[1] The progress of jointness was slow, however. A review of JCS action in creating a postwar system of unified commands suggests that the wartime experience left an ambiguous legacy for the development of jointness.

Unified command of U.S. forces in Europe began with the establishment in June 1942 of the European Theater of Operations, U.S. Army (ETOUSA), a joint command in which an Army officer exercised planning and operational control of assigned naval forces. Directed to cooperate with the British, ETOUSA commander Major General Dwight D. Eisenhower was, however, to maintain U.S. forces as "a separate and distinct component of the combined forces." With a task that called for Army leadership, the prospect of American participation in coalition operations led to early agreement by the War and Navy Departments to establish a joint command in Europe.[2]

Jointness was strongest in face of the enemy or when necessitated by coalition operations. But even in war, it fell prey to interservice rivalries and other concerns. In the Pacific, the lack of strong allied forces diminished coalition pressures to achieve unified command. Coupled with the special problems posed by the presence of General Douglas MacArthur, Army and Navy reluctance to trust their forces to the command of officers of another service led to separate theater commands. The Army promoted unity of

command by forces or functions while the Navy advocated achieving it geographically. While joint operations were routine in the Pacific, command of the entire theater had not been unified at the war's end.[3]

Dissatisfied by the separate command of Army and Navy forces in the Pacific, the Chief of Naval Operations, Fleet Admiral Chester W. Nimitz, called in 1946 for creating a single command for the entire Pacific less Japan, China, Korea, and the coastal areas of Central and South America. Based on Oahu and supported by a joint staff, the commander would "exercise unity of command" of all U.S. forces in the theater. The Army and Army Air Forces countered the Nimitz initiative with a proposal to organize command based on the assignment of forces. The heart of the problem lay in establishing an organization that centralized control of forces without impinging on what the services considered basic prerogatives in the command of their respective forces.[4]

With joint planners split along service lines, JCS deferred action for almost six months. Finally, the Army Chief of Staff, General of the Army Eisenhower, revived the issue with a paper outlining command arrangements worldwide. That proposal was greeted by one from the Navy, and subsequent staff deliberations were complicated when the question of control over strategic air forces was raised by General Carl A. Spaatz, the Commander of Army Air Forces. In December, having seen nine staff papers on unified command in less than three months, General Eisenhower sought a compromise. Admiral Nimitz was similarly inclined. Including provisions that dealt with problems posed by the requirements of Far East Command under General of the Army MacArthur and of strategic air forces, the plan that emerged established a worldwide system for the unified command of U.S. forces under JCS control.

Approved by the President on December 14, 1946, the "Outline Command Plan" was the first unified command plan, a basic document of the joint system. Publication of the plan did not, however, resolve the issue of the organization of unified commands. The debate over organizing by geographic area versus forces and functions was to surface repeatedly in the joint arena during the decades of the Cold War.[5]

As the Chairman observes in this issue, the lessons of World War II are boundless. In the medley of original contributions that make up this JFQ Forum, various aspects of that conflict are presented as tribute to the soldiers, sailors, marines, and airmen who fought as a team to lay the foundations of joint and combined warfare. JFQ

NOTES

[1] See, for example, statements by Ernest J. King and Henry H. Arnold on the inside back cover of Joint Pub 1, *Joint Warfare of the U.S. Armed Forces* (Washington: National Defense University Press, 1991).

[2] Maurice Matloff and Edwin M. Snell, *Strategic Planning for Coalition Warfare, 1941–1942, United States Army in World War II* (Washington: Office of the Chief of Military History, U.S. Army, 1953), pp. 196–97. Subsequent developments are covered in Maurice Matloff, *Strategic Planning for Coalition Warfare, 1943–1944, United States Army in World War II* (Washington: Office of the Chief of Military History, U.S. Army, 1959), pp. 102–05, 270–74.

[3] Louis Morton, *Strategy and Command: The First Two Years, United States Army in World War II* (Washington: Office of the Chief of Military History, U.S. Army, 1962), pp. 361–63; Ronald H. Spector, *Eagle Against the Sun* (New York: Vintage Books, 1985), pp. xiii–xv, 540–43; Matloff, *Strategic Planning, 1943–1944*, pp. 525–26, 536; Grace Person Hayes, *The History of the Joint Chiefs of Staff in World War II, The War Against Japan* (Annapolis: Naval Institute Press, 1982), pp. 93–96, 476–79, 563–66, 586–95.

[4] James F. Schnabel et al., *The Joint Chiefs of Staff and National Policy, 1945–1947* (Washington: Historical Division, Joint Chiefs of Staff, 1979), pp. 171–77.

[5] Ibid., pp. 177–86. The original commands were the Far East, Pacific, Alaskan, Northeast, Atlantic Fleet, Caribbean, and European. JCS also recognized the Strategic Air Command (SAC), an Army Air Forces command made up of units normally based in the United States and under a commander responsible to JCS. SAC was the first example of what later were known as specified commands. Control of the Bonin and the Marianas Islands was split with MacArthur controlling forces and local facilities, but having no responsibility for military or civil government or naval administration and logistics. The Cold War debate over unified and specified commands will be treated in *The History of the Unified Command Plan, 1946–1993* (Washington: Office of the Chairman of the Joint Chiefs of Staff, Joint History Office, February 1995).

Brigadier General David A. Armstrong, USA (Ret.), is Director for Joint History in the Office of the Chairman, Joint Chiefs of Staff, and a member of the *JFQ* Advisory Committee.

What Exactly Is Jointness?

By LAWRENCE B. WILKERSON

The last thirteen of my thirty-plus years as a military officer have been spent in joint duty assignments. For six years I have actually taught the essentials of jointness at the intermediate and senior levels of professional military education (PME), an experience which has provided many opportunities to discuss the nature of jointness with students. What has come out of those discussions is that jointness is *understanding* broadly what your fellow soldiers, sailors, airmen, and marines bring to the battle and *trusting* them to do it right and well—and their feeling the same way about you. All frills and lobbying aside, the essence of jointness is understanding and trust.

jointness is not greater than the sum of its parts—it is at best *the* sum of its parts

As General Colin Powell stated in the first edition of Joint Pub 1, "joint warfare is team warfare." But what about *seamlessness*, *synergy*, *joint doctrine*, *interoperability*, and all the other buzzwords? Let's examine some of the more prevalent ones.

Colonel Lawrence B. Wilkerson, USA, is deputy director of the Marine Corps War College.

Jointness is not seamless. It will have as many seams as the fallibility of human nature and technology impose. Indeed, to regard seamlessness as an achievable attribute of military operations is arrogant and dangerous. It is the sort of attitude that commits assets to the wrong purpose, gets people killed needlessly, loses wars, and devastates peace operations.

When it is achieved jointness is not greater than the sum of its parts—it is at best *the* sum of its parts. In fact the sum is most often reduced by that inevitable human element which does not understand or trust and therefore functions imperfectly if at all, and the mechanical parts that seem to achieve a 60 percent success rate on a good day. And there will always be such factors, human and mechanical, to contend with.

Jointness is not created by doctrine, joint or otherwise. It is brought about by people, good and bad. Like most things in life, it is created more successfully by a higher proportion of good people well trained in their service capabilities and how to employ them. Words printed on paper, no matter how attractive, are largely meaningless in the greater scheme of things. Common tactics, techniques, and procedures are vital to training. Just as critical to success in battle are people who while operating in accordance with their training can do *exceptional* things. Such acts, both large and small, are what bring order to confusion and win conflicts. One of the strangest paradoxes of human behavior is that people accustomed to studied routine must be capable of quick and decisive departure from that mind set

DOD (Helene C. Stikkel)

> When a team takes to the field, individual specialists come together to achieve a team win. All players try to do their very best because every other player, the team, and the home town are counting on them to win. So it is when the Armed Forces of the United States go to war. We must win every time. Every soldier must take the battlefield believing his or her unit is the best in the world. Every pilot must take off believing there is no one better in the sky. Every sailor standing watch must believe there is no better ship at sea. Every marine must hit the beach believing that there are no better infantrymen in the world. But they all must also believe that they are part of a team, a joint team, that fights together to win. This is our history, this is our tradition, this is our future.
>
> —Colin L. Powell, "Message from the Chairman," in Joint Publication 1, *Joint Warfare of the U.S. Armed Forces* (November 11, 1991)

to be repeatedly successful. Order must tend to chaos—indeed, teeter next to it with an exquisite sense of balance—in order to intuitively adapt, triumph, and endure.

Jointness is not produced by the ability of systems to share information, ammunition, fuel, or a host of other things, though this capacity—*interoperability*—is a vital technical aspect of deepening trust. Faith in a buddy's ability to help in a pinch is difficult to muster if one cannot even communicate. Of all the misunderstood and misdefined components of jointness, interoperability is the most important. It is the technical side of trust. Without it trust evaporates quickly in the heat of combat.

True jointness is not imparted by fiat. It is created the same way as the bonds of combat: in the cauldron of shared dangers, decisions, and death. Henry V did not stroll around the campfires on the eve of Agincourt to instill doctrine in the hearts and minds of his men. "A little touch of Harry in the night" was far more complex than any directive or written instruction. It was also far more integral to the stunning victory gained by the English over the French on the following day.

How does one teach jointness? Specifically, how do war and staff colleges—for the latter institutions are where jointness as described above truly fits into our PME system—best develop understanding and trust in students?

For an answer I reviewed the seminars that my former students consistently rated highest. They turned out to be the sessions in which the students had to use their own expertise to sort out a complex political-military problem, then give an appreciation of it as well as the solution. In some cases they had to execute that solution. This ranged from contemporary case studies of Urgent Fury (Grenada), Earnest Will (reflagged Kuwaiti tankers), Eagle Claw (Iranian hostage rescue), UNISOM II (Somalia) to full-fledged crisis wargames that lasted several days, the most successful of which dealt with the complex deployment of U.S. forces to the West Bank to provide humanitarian relief following massive refugee flows into that sector. All sessions were highly rated in each pedagogical category including learning jointness.

As I read and re-read the student critiques, the connection became apparent: that short of the cauldron of combat, the seminar can be as searing and instructive in its own way, given the right context.

That was a demanding situation confronted by a team possessing diverse service capabilities in which every member was well trained. An observation by a former Commander in Chief Pacific, Admiral William J. Crowe, drives this point home. In 1985, before becoming the Chairman, he remarked: "I want people for my staff who are thoroughly proficient in their own service's capabilities. Everything else will follow." Proficiency in one's own service capabilities is the *sine qua non* of jointness. Without it there can be no trust or understanding. The "everything else will follow" depends first on the individual and second on the frequency and quality of his exposure to combat and the seminar room, the latter being all that is available in peacetime.

proficiency in one's own service capabilities is the *sine qua non* of jointness

Trust and understanding are derived from service competence. That is the *only* foundation on which genuine jointness can be built. Threaten that and you threaten jointness. That is why the increasing power of the Joint Staff is so troublesome—not now or over the next year but for the future. Thus far that growing power has not impinged upon the flourishing of separate service cultures or the healthy competitiveness which they naturally engender, but given its current direction it will.

Even in apparently insignificant areas signs of the increasing power of the Joint Staff and the potential for abuse can be found. The proposed introduction of PME learning objectives for force protection and risk management is a case in point. The Joint Staff maintained that military education policy should be changed to reflect specific PME learning objectives for these subject areas; others held that such a sudden change contradicts good education policy. These opponents argue there is a more satisfactory way of evolving an area of educational focus, namely the subject area of emphasis method. Quality education is best served by gradual change that is carefully evaluated rather than by rapid-fire, knee-jerk change that often is rooted in political expediency (which is the atmosphere that influences decisions by the Joint Staff). In this instance the education community won the argument; however, the trend seems to be moving in the other direction. The momentum is on the side of the Joint Staff.

This is not necessarily bad. After all, one objective of the Goldwater-Nichols Act was to improve the Joint Staff—something that has been done remarkably well. Indeed, the Joint Staff is the finest, most efficient staff in the Armed Forces—perhaps in the world. As the classic Greek dramatists warned, however, such excellence can contain the seeds of its own destruction.

The criticism offered here is not related to the inordinate and largely American fear of the dreaded general staff. Most people who harbor such concerns today do not understand the very concept they protest. My argument is more closely related to what Douglas Southall Freeman called "the odds." In short, there are only so many truly excellent people in any enterprise and to concentrate them at a single point in an organization may well create an imbalance of skill which endangers the health of the entire organization. The efficiency and quality of the Joint Staff have to an extent been achieved at the expense of service staffs and—while few admit it—to the great consternation of the civilian staff serving the Secretary of Defense who, by the very nature of their appointed status, cannot match the energy and level of expertise of the Joint Staff.

The Secretary's effort to create a schoolhouse for civilians under the Defense Leadership and Management Program is aimed in part at redressing this situation. The lead paragraph of the directive issued on the program in April 1997 reveals much: "This directive...establishes a DOD-wide framework for developing future civilian leaders with a DOD-wide capability in an environment that nurtures a shared understanding and sense of mission among civilian employees and military personnel."

The growing power of the Joint Staff at the expense of service staffs may be nothing to worry about. The primary concern is that with the declining quality of service staffs, the nurturing of service competence, which is the foundation of jointness, will fall off. Therefore, keeping a wary eye to that possibility might be wise. *Power corrupts, and absolute power*—but you know how the old aphorism goes.

JFQ

Joint Warfare and the Army-Air Force Team

Northrop Grumman Corporation

JSTARS aircraft and light ground station modules.

By DENNIS J. REIMER *and* RONALD R. FOGLEMAN

The Army and Air Force are natural partners in the conduct of combat operations on and over land. Since day-to-day operations are intertwined, particularly in areas of service support, we often take this partnership for granted. It was forged during World War II, Korea, Vietnam, and most recently in the Gulf War. The most important teamwork occurs on the battlefield, where our combined capabilities produce a synergistic increase in joint combat power that provides a decisive advantage over an adversary. The Army-Air Force team is robust and forward looking, unequalled among the armed forces of the world. We intend to strengthen that partnership as we work together in the future.

General Dennis J. Reimer, USA, and General Ronald R. Fogleman, USAF, are the chiefs of staff of their respective services.

Cooperation does not imply that we have identical views on every issue, nor that we should be combined. Each service optimizes its unique strengths. National security depends upon distinct warfighting capabilities on land, at sea, and in the air. Moreover, each service brings separate core capabilities—the missions they perform best—to the joint table. One lifetime is barely sufficient to master every skill needed to fight and lead in one medium of war. Learning to fight jointly in three is a tough business—leveraging unique capabilities, specialties, and individual competencies to the warfighting advantage of all.

Such efforts are especially important in a resource constrained environment. Together we can selectively apply advances in technology to compensate for the redundancies that we have lost through the force drawdown. This process of leveraging one another's strengths builds on current doctrinal foundations to evolve a more mature, complementary perspective of joint operations. The savings will be measurable in both lives and resources, and ultimately by mission success.

relations between the Army and Air Force became strained as each tried to incorporate lessons learned in the Gulf

The Persian Gulf War provided a glimpse of the dramatic changes in warfare and results of rapid evolutions in technology. It also demonstrated the tremendous power which the Army and Air Force could generate by working together and with the naval services and coalition partners. After an intense air offensive disabled Iraq's key capacities and reduced its warfighting capability, the ground offensive, supported by maximum tempo air operations, demonstrated the effectiveness of teamwork in defeating an adversary and minimizing American casualties.

Both of our services gained important insights into 21st century military operations from the Gulf War; however, there are divergent interpretations of that brief conflict. Relations between the Army and Air Force became strained as each tried to incorporate and capitalize on lessons learned in the Gulf. We recognized doctrinal disparities and quickly began an effort of cooperative review to ensure our preeminence as the world's finest air-land team.

Developing Understanding

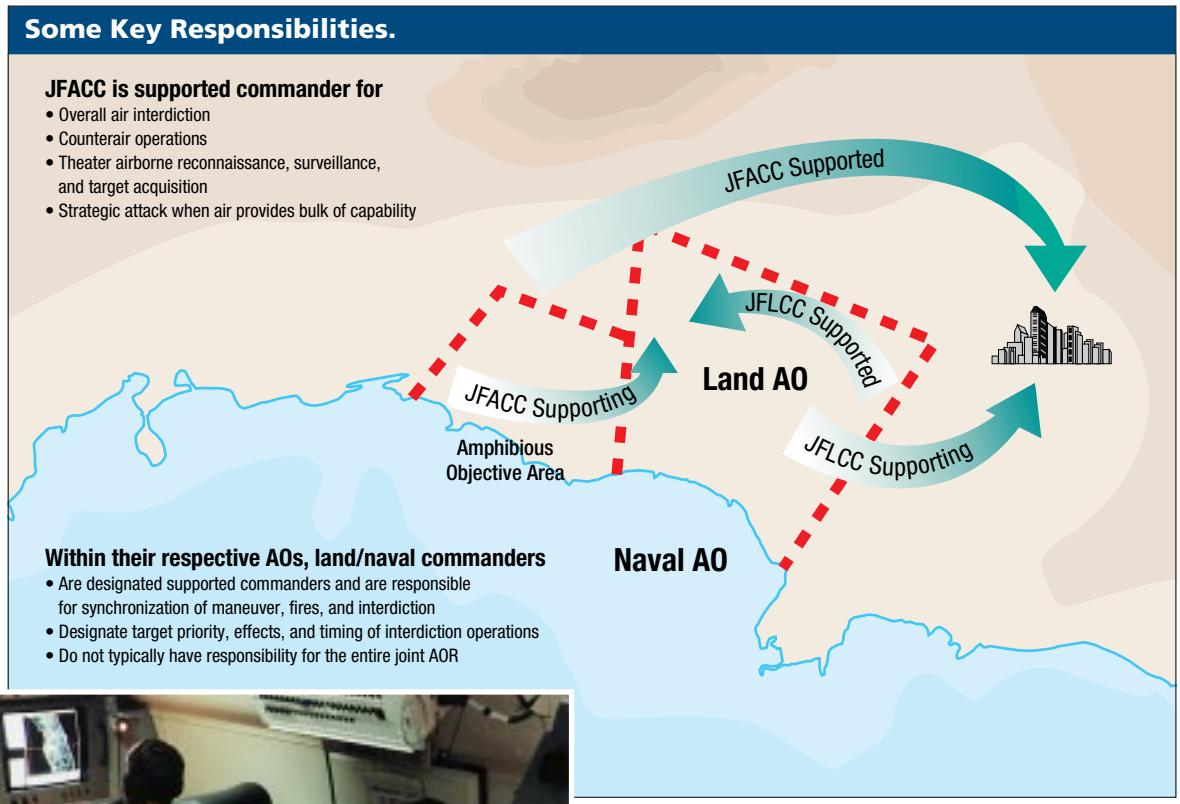
Since the Gulf War, in what has become an annual event, senior leaders of our respective services have met to discuss lessons learned as well as opportunities for improving joint operations. At the Army-Air Force Warfighter Talks in 1994 we set up a working group to tackle tough issues. Chartered by the deputy chiefs of staff for operations and plans of both services, the group took on the job of identifying and resolving these issues. Building on a heritage of teamwork and mutual respect, Army and Air Force officers have devoted months to clarifying matters of common interest and finding useful solutions. This has led to shared understandings, increased trust, and pragmatic agreements. Numerous organizations, including Air Combat Command, U.S. Army Training and Doctrine Command (TRADOC), 1st Battlefield Control Element (BCE) at Fort Bragg, and 9th and 12th Air Forces, have helped the group. After a mid-year review revealed there were more areas of agreement than disagreement between our two services, the working group refocused on air and missile defense and on joint control measures.

The first issue centers on controlling air and missile defense assets not directly assigned to corps commanders and on theater missile defense (TMD) attack operations in the area of operations (AO) of land component commanders (LCCs). Since CINCs often employ echelon-above-corps (EAC) air and missile defense assets as theater assets, the Air Force held that such units should be put under the operational control (OPCON) of joint forces air component commanders (JFACCs). As stipulated in joint doctrine, JFACCs are normally area air defense commanders (AADCs) and will usually control all theater air and missile active defense efforts. Likewise, the Air Force saw TMD attack operations—actions to locate and destroy hostile missile launchers and their associated command, control, and supporting infrastructure regardless of their location—as counterair efforts under JFACC purview. The Army viewed TMD attack operations inside the land AO as an integral part of the LCC scheme of maneuver and supporting counterfire operations.

The group also examined joint control measures because of the apparent friction over which component commanders should plan and control deep operations beyond fire support coordination lines (FSCLs). The Air Force considered JFACCs as best suited to coordinate operations beyond FSCLs, while the Army thought LCCs should plan and synchronize fires in the entire land AO. When the working group could not completely resolve TMD or joint control measures, we agreed to address them in a four-star review at the Army-Air Force Warfighter Talks in December 1995, the results of which are described below.

Joint Doctrine

Service concerns arise when areas of responsibility potentially overlap, creating questions over control of combat assets. But on a fluid, dynamic battlefield joint force commanders (JFCs) cannot



Northrop Grumman Corporation

Interior of JSTARS aircraft.

permit disagreements on issues such as targeting and missile defense to remain unresolved. Regardless of how complementary our views on joint operations might be, specific responsibilities produce legitimate differences among component commanders. We must minimize the differences and move toward greater understanding of one another's strengths and limitations.

Each component has area and functional responsibilities as well as custody of the people and resources under its command. These responsibilities may intersect when components work together. Thus we must allow flexibility for responsibilities to shift during various phases of a campaign and act to minimize mutual interference and maximize mutual support. What may be optimum for one component can come at the expense of others—by decreasing combat power or increasing risk. Joint doctrine is an excellent starting point for assisting LCCs and air component commanders (ACCs) in efforts to resolve any overlaps. Together we must learn to tailor air-land solutions to circumstances, missions, risks, and opportunities at hand.

Commanders normally seek to conduct operations to gain maximum advantage at minimum risk to their forces. For example, ground commanders stress counterfire and maneuver operations while air commanders stress strategic attack, counterair, and interdiction; yet all seek to attack deep targets and enemy air defenses to provide maximum flexibility for their forces. Such operations are not always mutually supportive, especially when resources are scarce.

Joint Publication 3-0, *Doctrine for Joint Operations*, published in September 1993, offers direction for every element of a joint force. It instructs JFCs, as senior commanders, to provide guidance and set priorities. Moreover, it establishes the latitude required to optimize and fine-tune arrangements between land and air forces under various circumstances. This publication serves as a common baseline for understanding both in and among services, and also within our warfighting arrangement, the unified command structure. No component should develop doctrine that directly contradicts this validated baseline.

as partners in the air-land team, we are committed to smooth, seamless operations throughout the theater

Joint doctrine ascribes authority and responsibility to JFCs and provides a framework for conducting joint operations and designating the roles of supporting and supported commanders. Both services recognize that LCCs are normally supported commanders in assigned AO boundaries and ACCs are normally supported commanders for theater air operations. Joint doctrine provides flexibility to allow JFCs maximum latitude to devise the best solution for a mission. If conflicting priorities arise, JFCs will determine the precedence of priorities. However, a solid basis of trust between component commanders will go a long way towards alleviating potential problems.

Key to Success

Coordination among components is critical on the battlefield. One of the best methods for ensuring proper coordination of operations is sound command and control (C^2). Modern warfare requires us to increasingly share real-time, common views of the battlefield. We must understand overlapping as well as occasionally intersecting needs of component commanders, reconciling their different views with improved risk management techniques. The commanders have optimum tools in their staffs and headquarters to conduct detailed planning and execute missions. Moreover, they liaise with other components to facilitate both the flow of information and timely decisions. Senior liaison elements are important in sharing the broad concerns of component commanders.

BCE is a critical Army element attached to the senior command and control agency within the Air Force, the Air Operations Center (AOC). Similarly, the Air Force provides Tactical Air Control Party (TACP) representatives at key Army headquarters. BCE and TACP should be fully staffed with highly trained personnel to support component commanders. Senior members of both agencies must understand the intent of commanders as well as provide timely, informed decisions.

As partners in the air-land team, mutual understanding of command relationships must be strong and clear. Just as Generals George S. Patton and O.P. Weyland, the respective commanders of III Army and 19th TAC in World War II, recognized the need for a strong C^2 relationship between land and air components, we are committed to smooth, seamless operations throughout the theater.

Areas of Concern

Using the efforts of the working group as a point of departure, the senior leadership of our services prepared five agenda items for discussion last December: the role of the Joint Targeting Coordination Board (JTCB), joint control measures, command and control arrangements for air and missile defense, offensive counter-air and TMD attack operations, and dual hatting of JFCs. Many of these issues overlap and some may never be resolved. But when possible, candor will pave the way for greater understanding. In addition, we covered tangential areas that impact our overall relations on the battlefield. Further advances in connectivity, coordination, and perception of sister service doctrine will decrease differences and increase mutual trust.

Joint Targeting Coordination Board. The JTCB concept has been controversial since the Gulf War. The Air Force held that the board would hinder operations, while the Army contended that it was necessary to establish targeting priorities. Joint Pub 3-0 codifies JTCB without going into great detail. JFCs typically create JTCBs and define their roles. The services accept the vision of JTCB, but we agree it must be focused at a macro level. JTCB as a planning support function assists components in following the intent of JFCs in executing operations by preparing targeting guidance, refining joint target lists, and reviewing target information. The board must maintain a campaign-level perspective and should not be involved at levels best left to the component commanders, such as selecting specific targets and aimpoints or developing attack packages.

Joint Control Measures. The heart of this doctrinal discussion concerns operations beyond FSCLs but within the land force AO. Since both commanders seek to maximize results in this area consistent with their intent to shape the battlespace, it represents the greatest overlap of land and air objectives. The land component's capability to exploit deep attacks before an enemy can

F–16 Falcons during Roving Sands '95.

Combat Camera Imagery (Andy Dunaway)

Combat Camera Imagery (Jim Steele)

Patriot battery during Roving Sands '94.

adjust to them will vary with depth, terrain, resistance, and resources. Air component capabilities will vary less with distance, but since air forces operate beyond FSCLs on a normal, continual basis, ACCs must also manage risks to their forces. Coordination and deconfliction are essential to reducing duplication, conserving resources, maximizing results, and managing risks in this area. Managing risks requires careful design and tuning of control measures and authority to minimize restrictions on all forces and maximize combat power. JFCs will normally establish forward AO boundaries and adjust as necessary to balance the needs of LCCs to rapidly maneuver with the needs of ACCs to rapidly mass and employ airpower with minimal constraints.

Between FSCL and AO forward boundaries, LCCs are supported commanders and must coordinate operations with ACCs when possible. LCCs should judiciously use control measures such as FSCLs to facilitate attack operations. ACCs should coordinate attacks inside the land AO to complement support of both the needs of LCCs and the overall theater campaign plans of JFCs. Improved friendly and enemy situational awareness, rapid information sharing, expertise in BCE and TACP, and more advanced tactics, techniques, and procedures (TTP) will also improve mutual support between the land and air components.

Whenever we discuss targeting the placement of FSCL inevitably comes up. Joint doctrine grants LCCs authority to place this line anywhere within their AO. To maximize the effectiveness of both land and air forces, LCCs should coordinate the placement of this line with ACCs to ensure maximum coverage of all enemy targets with available assets. It is incumbent on each component commander to establish a level of mutual trust with the other commanders to make this relationship work. ACCs must provide LCCs making FSCL decisions with relevant facts that will help them, but must trust LCCs to place FSCLs in the best location to support the objectives of JFCs.

Air and Missile Defense. Coordination of fires naturally leads to this next area of concern. This issue centers on the degree of control the area air defense commander should have over EAC air defense assets. The Air Force holds that JFACCs—who are normally designated as AADCs—are supported commanders for overall theater air and

missile defense and should exercise OPCON over air defense units unassociated with a corps. The Army is reluctant to release such control over its organic EAC air defense assets.

While no one disputes the right of each unit to self defense, we must balance that right with the need for close coordination of fires against enemy threats beyond FSCLs to prevent fratricide. Since JFACCs will be operating forces in this area for counterair, interdiction, strategic attack, and surveillance and reconnaissance, coordination and deconfliction are crucial. Both services agree that while corps commanders will retain OPCON over their organic air defense units, AADCs as supported commanders will establish rules of engagement and assign air defense missions for EAC assets. LCCs must communicate their desires but trust AADCs to make the correct decisions.

political and operational pressures on JFCs were the crux of the dual-hatting issue

The Army and Air Force have made great strides in target identification, attack cueing, and responsiveness since the Gulf War, and more improvements are on the horizon. The threat posed by weapons of mass destruction emphasizes the need to share information, tailor countermissile dispositions and response postures, and work together to create the greatest possible risk to enemy missiles. LCCs must communicate their needs to JFACCs/AADCs in developing air and missile defense plans. This close coordination is essential to ensure timely and correct decisions.

TMD Attack Operations. Closely tied to air and missile defense are TMD attack operations. While the Air Force believes TMD is part of the counterair effort requiring theater-wide integration, the Army holds that these operations are broader in scope and considers existing fire support as the most responsive for attacking enemy missiles in an LCC's AO. Regardless of opinions, common sense dictates that between FSCL and the AO forward boundary, LCCs and ACCs must coordinate TMD attack operations to maximize effects and minimize fratricide. There will be times when an airborne asset provides a more timely response to pop-up targets than a corps commander's assets. At other times a corps may have the appropriate weapon. The Air Force is considering increasing the amount of "on-call" assets available for TMD attack operations. With improved connectivity, coordination and approval will become easier. Until that time, current doctrine provides JFCs with the flexibility to develop the necessary C^2 arrangements based on the situation in theater.

Dual Hatting. Political and operational pressures on JFCs were the crux of the dual-hatting issue. Because dual hatting a corps commander as a division commander or a numbered air force commander as a wing commander would be irregular, the Air Force contended that a dual-hatted JFC or CINC would also be irregular, resulting in a possible loss of focus on theater or component details. During our discussions, senior Army leaders acknowledged that this could occur, but the likelihood is low. Dual hatting must be handled on a case-by-case basis. CINCs must determine, subject to the approval by the Secretary of Defense, whether to simultaneously retain command of an entire operation as JFC and a component—land, maritime, or air—or to designate another senior leader as component commander. This is in line with joint doctrine. Situation-specific political or operational considerations will influence JFC decisions to retain leadership of a specific functional component in addition to the overall JFC role.

Looking to the Future

In addition to those issues discussed at the Warfighter Talks, there are many areas in which interservice cooperation has made great strides. While the Army-Air Force working group offers an avenue to pursue such developments, other organizations including TRADOC and ACC, Army fire support elements, and various Air Force wings and numbered air forces are constantly striving to enhance Army-Air Force team operations.

To improve TTP, the services have been developing a multiservice targeting TTP under the Air, Land, Sea Application Center (ALSA). Common TTP will allow component commanders to know how other components operate. Common procedures, as well as improved C^4I, will help ensure proper prioritization, deconfliction, and attack of targets.

There has also been an extensive effort to improve connectivity in combat identification and tracking. Tests conducted by the All Service Combat Identification Evaluation Team (ASCIET) in Gulfport, Mississippi, in September 1995 identified specific areas which needed attention. We must develop both the hardware and processes to pass real-time combat identification data among elements of all services to reduce the possibilities of air-to-surface, surface-to-air, and air-to-air fratricide. Although the work of ASCIET has just begun, its contributions will receive careful attention because we stand to gain much from its successes in the area of combat risk management. The Army and Air Force plan to incorporate

ASCIET into the next Roving Sands and Blue Flag air-land combat exercises.

Integration of this information with evolving capabilities such as the joint surveillance and target attack radar system (JSTARS) and unmanned autonomous vehicles will provide commanders with improved battlefield information. Real-time imagery is a step towards the information dominance that we are striving for.

We are making significant progress in increasing connectivity between Army and Air Force planning and fire control elements. These initiatives have the potential to greatly increase the ability to share and deconflict data on emerging targets in real time. Ongoing work to link the Air Force contingency theater automated planning system (CTAPS) and Army advanced field artillery tactical data system (AFATDS) will ensure our forces put the right weapon on the right target at the right time, increasing effective firepower while reducing waste and delay. Connectivity between air and missile defenses (such as the Army TMD Force Projection Tactical Operations Center and the Air Force combat integration capability) also helps to rapidly deconflict air and surface targets. This is increasingly important as weapons and threats change and a commander's reaction time decreases.

The Army-Air Force Warfighter Talks, as well as working group and interservice efforts, are each small steps towards greater understanding between our services. Improving connectivity, strengthening command relationships, and developing trust are key elements in ensuring the Army and Air Force remain the premier air-land team. We have witnessed numerous advancements over the past year that increase a commander's awareness of the battlefield. By the turn of the century, through interservice initiatives and systems like JSTARS, our commanders should enjoy increased interoperability and a more complete view of the battlefield. Both technological enhancements and sound joint doctrine are essential in strengthening ties between our services. But great technology and good doctrine alone are insufficient. Without trust and mutual understanding, an enemy could exploit our weaknesses and possibly defeat us.

Trust is based on insight and familiarity, knowing who will do the right thing in the proper way. A soldier's expectation of airpower must be based on the realization that airmen have theater-wide perspectives and responsibilities. An airman must appreciate the vital role of airpower in land combat and understand that air flown in support of LCCs must complement the plans of LCCs. The Army and Air Force depend upon and leverage the capabilities of one another to be decisive in battle. Our separate strengths, as well as differences, will ensure that we remain an air-land team without equal. In fact, no other military will even come close. JFQ

Destroyed Iraqi fighter.

DOD

General of the Army Omar Nelson Bradley

(1893–1981)

Chief of Staff, U.S. Army
Chairman, Joint Chiefs of Staff

VITA

Born in Clark, Missouri; graduated from Military Academy (1915). Assigned to 14th Infantry and duty in the West (1915–19). ROTC duty, Minnesota and South Dakota (1919–20); instructor, West Point (1920–24). Advanced course, Infantry School (1925). Served with 19th and 27th Infantry, Hawaii (1925–27); in charge of National Guard and Reserve affairs for Hawaiian Islands (1927–28). Attended Command and General Staff School (1929) and Army War College (1934). Instructor, Infantry School (1929–33) and West Point (1934–38). Chief, operations branch (G–1), War Department (1938–40); assistant secretary, General Staff (1940–41). Commandant, Infantry School, and established infantry OCS (1941–42). Commander, 82d and 28th Infantry Divisions (1942–43). Personal representative of commander, North African Theater of Operations (1943). Commander, II Corps in North Africa and Sicily (1943), and First Army and 12th Army Group in invasion and final European campaigns (1944–45). Administrator of veterans affairs (1945–47). Chief of Staff, U.S. Army (1948–49); responded to National Security Act of 1947 with Army reorganization leading to appointment of vice chief and two deputy chiefs of staff, consolidated technical services under a director of logistics, and finance and management under a comptroller. Served as first Chairman, Joint Chiefs of Staff (1949–53), and first Chairman, NATO Military Staff Committee (1949–50); promoted to General of the Army (1950). Died in New York City.

Portrait of General Bradley by Clarence Lamont MacNelly.

Courtesy of the U.S. Army Art Collection

[In 1949] Congress enacted several laws modifying the 1947 National Security Act, designed to intensify unification. One [law] . . . established the formal post of Chairman of the Joint Chiefs of Staff, who would serve a two-year term (and be eligible for reappointment to a second term in time of peace) but who would not have a formal "vote" in the JCS.

Probably on Ike's recommendation, [Secretary of Defense] Johnson then turned to me, even though I had told Ike earlier in the year I did not want the job. I now changed my mind. I agreed to serve in the job one term—two years. The main reason for my change of heart was my deep concern about the state of the military establishment. Owing to the cancellation of the supercarrier, there was a vicious mutiny afoot in the Navy . . . [which] could conceivably tear apart the Department of Defense, possibly tempting the Kremlin to capitalize on our military disarray. A firm but fair JCS Chairman, assisted by a neutral Army general (my replacement as Army Chief of Staff), might be the moderating force that could prevent a crippling brawl.

On August 12, Louis Johnson and I went to the White House, where President Truman announced my nomination as Chairman of the Joint Chiefs of Staff. The Senate approved the nomination at once, and at 0900 on August 16, in a modest ceremony at Johnson's office, I was sworn in. The reaction to my appointment generally was positive. I was still blessed with a "favorable press." However, to the Navy I was still an enemy. With the JCS now officially enlarged to four men . . . the Navy felt that even though I had no official vote, its voice would be further weakened.

—From *A General's Life* by Omar N. Bradley and Clay Blair

U.S. Navy (Jeff Elliott)

LIVING JOINTNESS

by WILLIAM A. OWENS

USS Iowa firing 16–inch guns.

U.S. Navy

Summary

There are two competing views of jointness in vogue. One is *specialization* which argues that the services should stick to the roles for which they were established. The other is *synergism* which holds that military capabilities of various services should be blended in response to a given crisis or contingency. In the former view the capabilities preexist while in the latter they must be cobbled together on an ad hoc basis. Neither view has gained ascendancy thus far, but the Armed Forces must define the practical meaning of joint operations and then adopt it as second nature. The Navy and Marine Corps should embrace synergism because it enshrines enabling, a concept advanced in ". . . From the Sea." If tested synergism is the most compelling view since it draws on common ground which the services have developed through joint exercises, operations, and war games.

Joint operations are taken almost as a given in Pentagon pronouncements and it is virtually impossible to find anyone who professes to be against them. The unanimity with which they are endorsed, however, is not supported by an in-depth, well-articulated grasp of what joint operations are or how to conduct them. There are some areas of agreement. By definition, joint operations involve more than one service component, and most professional officers would argue, I think, that the fundamental reason for having joint operations is to increase overall combat effectiveness.

Competing Views

Beneath these common understandings, however, there are at least two competing views of how different force components should be used to increase combat effectiveness. One view argues in favor of using the best qualified force component for a given mission which implies that overall combat effectiveness can be best enhanced by fitting forces to missions for which they are specialized. Let's call this view the specialization argument. The other claims that higher combat effectiveness is made possible by combining forces in such a way that

higher outputs result than could be achieved by simply adding the outputs of different forces. Let's call this the synergism argument. These views don't really represent two sides of the same jointness coin, and accepting one or the other ultimately leads to differing operational behavior and force structures.

Discussions of joint operations often refer to a toolbox analogy which entails an admonition to consider all the forces available to a joint commander as if they were the contents of a toolbox. In this analogy a joint force commander can pull the forces needed to do the job from the toolbox, regardless of whether the tools bear the markings of the Army, Navy, Marine Corps, or Air Force.

U.S. Army

101st Airborne Division convoy during Desert Storm.

An advocate of what I called the specialization view of joint operations would say that the toolbox analogy is exactly right and explain that a joint commander turns to the box and chooses the right tool for the job. For instance, if required to plan and conduct a strategic bombardment campaign, the joint commander would assign the missions to the force component that knows the most about strategic bombardment campaigns—perhaps to the Air Force. An advocate of what I termed synergism would also say the toolbox analogy was exactly right. But he would explain that a joint commander would put together the right tool out of various force components. Then if a job required strategic bombardment the air assets available from all services would be combined in the most productive way by a joint commander.

The operational implications of these two views, I suggest, vary greatly so far as the use of force is concerned. The essence of specialization is to clearly differentiate combat responsibilities along force specialty lines and break out missions by service components while that of synergism is almost the opposite, at least with respect to mission assignments. Specialization takes advantage of inherent efficiencies in the integrated traditions, doctrines, discipline, and procedures of a single service; synergism blends particular service strengths on a mission basis to provide higher combat output than either any single service or the sum of individual service contributions could produce.

Each view leads down a separate path of logic and to a different practical understanding of joint operations. Specialization, for example, ultimately argues in favor of a command and control system that keeps the responsibilities and operations of various service components distinct and separate. Interaction among service components, according to this view, should be concerned with maintaining distinctions and keeping lines of responsibility from overlapping, for operational clarity will keep components from getting in each other's way and allow them to carry out their particular specialty with greatest effectiveness. There is synergism also in this approach, for if each service component meets the demands of its particular mission, the result will be an effective, smoothly conducted war or operation. That is, if Air Force, Navy, and Army components focus on air, sea, and ground campaigns respectively, the overall operation will benefit. Air Force resources will not be diluted by allocating sorties to support Army ground operations, Navy resources will not be stretched between providing gunfire support to the ground campaign and destroying an opponent's naval forces, and Army resources will not be diverted to protect Navy or Air Force bases. Is this an exaggerated extension of the inherent logic of this view? Yes. But it is essentially the logic that girds spirited defenses which each service makes in justifying its own aircraft, communications, and logistics systems.

The logical extension of synergism generates similar problems of unreasonableness. When pushed to the extreme, for example, it not only erodes individual service traditions, doctrines, and procedures, but ultimately argues in favor of unification and differentiating among forces strictly in terms of functional capabilities. However rational such a

Admiral William A. Owens, USN, has been nominated to be Vice Chairman of the Joint Chiefs of Staff. He has most recently served as Deputy Chief of Naval Operations for Resources, Warfare Requirements and Assessments. Previously he commanded the Sixth Fleet and NATO Naval Striking and Support Forces Southern Europe.

F–117 Stealth Fighter.

Lockheed (Schulzinger and Lombard)

conclusion might be, of course, going too far could undercut recruiting, training, and preparing men and women who make up the force as suggested by the Canadian experience with unification.

I have exaggerated both arguments to point out the differences between them. In the real world the contrast is not as dramatic, and as Operation Desert Storm demonstrated the use of force in an actual conflict is likely to involve aspects of specialization and synergism. But it is important to note that two potentially divergent views of joint operations underlie the discussion. Neither has as yet prevailed, though both have legitimate claims on our understanding of jointness. This leads me to make two suggestions.

we must step beyond the idea of joint exercises toward operating jointly on a continual basis

Practical Meaning

My first suggestion is to promote day-to-day activities by the forces of all services which will work out a practical balance between the two views of jointness. The Armed Forces, in large measure due to the active interest of General Colin Powell in developing an in-depth understanding of joint operations, has come a long way in this regard over the last several years. There are more joint exercises being conducted today than at any other time since the end of World War II.

It's hard to argue, however, that there will ever be too many. More importantly, I think we have to go further in trying to work out the practical meaning of jointness and in defining where the right balance really lies between specialization and synergism. In short, we must step beyond the idea of joint exercises toward operating jointly on a continual basis. This goal challenges both the current joint command structure and the peacetime activities of all services other than participation in joint exercises. It challenges the existing joint command structure because it argues for creating standing joint commands (as opposed to joint task forces) at the tactical level, the level of command most often engaged in actual war fighting—that is at corps, numbered fleet, and numbered air force level. Currently joint commands do not extend to this level. While joint task force commands do, they are almost always formed for specific operations. What I am suggesting here, however, is what might be called standing joint force commands at the regional three-star level, maintaining direct operational command over units of each service that normally would only be part of an identifiable joint command in a particular operation or crisis.

An Interim Understanding

The practical meaning of jointness is derived essentially from promoting joint exercises and joint operations, and will emerge as operational forces work out the myriad aspects of what joint operations entail. The military does not, however, have the luxury of not thinking about what joint operations should be until all the details are worked out. We in the Navy, in particular, are in need of a non-rhetorical definition of what joint operations imply, because we have committed ourselves to them both in the way we expect to use naval forces and in the designing, structuring, and sizing of naval forces for the future. We have stated formally in documents such as "... From the Sea" that the primary role of naval forces is to "enable joint operations in littoral areas," and we have informed Congress and the

American people that we will build a Navy that is better able to do this.

To return to the distinction between the two notions of jointness, the Navy ought to line up behind synergism because this view is far more compatible with the concept of enabling.

Enabling Joint Operations

Some have argued that enabling is something temporal in character, referring primarily to the ability of forward deployed naval forces to be the first on the scene in a crisis; and if the crisis cannot be contained, to secure beach heads and prepare for the arrival of ground and ground-based air power. Once accomplished, according to this argument, naval forces fight alongside the other forces and—after the objectives of the operation are achieved and the ground and ground-based air power withdraw—cover the post-conflict period. I think this is an important part of what the Navy ought to mean by enabling.

the Air Force and Army also ought to add this concept of enabling to their operations

But there is more to it. I believe the concept of enabling ought to extend throughout these stages, and that naval forces ought to operate continually with the purpose of aiding and facilitating operations of the other service components that will be involved in conflict. We ought to operate naturally in such a way that we help the Army do what armies must do, and assist the Air Force in doing what it must do. This does not posit a subordinate or unique role for naval forces. The Air Force and Army also ought to add this concept of enabling to their operations. And it does not mean the Navy can or should abandon its classical conflict focus on control of the seas, even if the seas are most likely to be the littorals of the world for the foreseeable future. But, for the Navy, it means coming to appreciate the priorities of conflict and peacetime operations from the perspectives of the other services and acting accordingly.

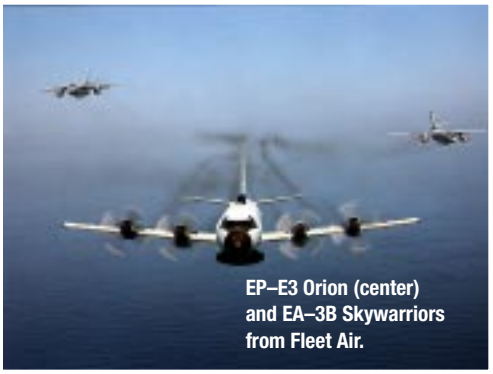
To illustrate this point, I would like to suggest how naval forces could enable some basic concerns of the Army and Air Force, respectively, in littoral warfare. My example for the Army is taken from what military planners are wrestling with as the Army develops its expeditionary force concept and that for the Air Force deals with something long near and dear to air power theorists—strategic bombardment.

Building Ground Power

Recognizing changes in the world, and particularly the likelihood of fighting where there are no prior overseas deployments, the Army has been developing an understanding of expeditionary warfare. This is not the place to discuss the emerging concept in any detail,[1] but one key aspect is the need for a sequential, rapid build-up of power in the region in which conflicts will occur. Briefly, the Army's answer to the problem of fielding overwhelming, combined arms force rapidly in a potentially hostile environment focuses on deploying units in a logical sequence; those arriving early would be charged with and capable of both preparing for the arrival of larger, heavier units logistically and protecting their arrival. Thus, the Army normally plans for the early deployment of units that can protect themselves and provide air and ballistic missile defenses.

The sequential approach to the buildup of power has long been a central tenant of the Army view of expeditionary warfare, and the Army has long recognized the inherent tension between building its strength sequentially and in a defensible manner, and doing this rapidly. It takes time for units that arrive initially to get in place, and the rate at which following units can arrive and take up their places is a function of available lift and reception capabilities. Airlift, the fastest way to deliver forces, will always be constrained by the capacity to provide all the things everyone wants in the theater of operations early. And such constraints delay the rate of building ground power.

The Navy's role in assisting the build-up of Army power has traditionally been reflected in terms of how fast weapons and materiel can be delivered to the intended debarkation points by sea. But there are other ways in which the Navy can cooperate to increase the rate of building up Army strength abroad. One is to provide or to cooperate in establishing air defense and ballistic missile defense screens that are a key early step in the Army build-up sequence. Another is to hold up the advance of enemy land forces



EP–E3 Orion (center) and EA–3B Skywarriors from Fleet Air.

U.S. Navy (Franklin P. Call)

Guided missile destroyer *USS Kidd.*

U.S. Navy

by focused surveillance, intelligence, and fires from tactical aircraft, naval guns, and sea-based missiles, including Tomahawk land attack missiles and seaborne versions of the Army Tactical Missile System (ATACMS).

The agility of sea-based systems allows them to be deployed in such a way as to provide for the air and ballistic missile defense of any coastal area. Operationally, this can mean extending a defense umbrella over systems like the Patriot or Theater High Altitude Area Defense (THAAD), by protecting areas where land-based air and ballistic missile defense systems are established. In a regional conflict in which there is a premium on the rapid build-up of land-based forces, sea-based theater defenses could be of particular benefit. This is because of the airlift required to transport a land-based defense system. Getting a THAAD battery in position to protect against missile attacks eats up airlift. And since a regional commander faced with a possible missile attack would want to establish a defense against it as the first step of a deployment, airlifting a land-based system would eat up lift capabilities precisely when competing transport demands would be highest.

The sea-based system could ease competition for airlift in one of two ways: by providing a defensive umbrella to allow later introduction of a land-based system or by obviating the very need to deploy a land based system at all.

Cooperative Engagement and Forward Passes

But a more synergistic approach would be to deploy the fire control radar of the land based system and link them with the Aegis missiles off shore. The demanding airlift requirements to establish a land-based ballistic missile defense system are generated largely by what it takes to transport the missile and missile support components of systems like THAAD. Accordingly, transporting only the

U.S. Navy (Franklin P. Call)

F–16As taking off for Iraqi targets.

radar initially would ease the demands on airlift greatly when competition for it would be high. The basic idea would be to deploy an air and ballistic missile defense system that could use land-based radars to detect, track, and control missiles from the sea for the intercept.

Cuing and communications to support this forward pass concept are technically feasible. They would allow land-based acquisition and fire control radar, perhaps located at the extremities of the land coverage provided from the sea-based defense system (which is a function primarily of the range of fire control line-of-sight radar aboard the Aegis ship), to identify the "basket" into which the sea-based interceptors would be fired, and then to assume control of those missiles and direct destruction of incoming ballistic missiles or aircraft. In effect, this cooperative arrangement would extend the range at which the sea-based missile launching platform could destroy ballistic missiles while easing the early demands on airlift, thus allowing a more rapid introduction of other land and land-based air forces.

Enabling Strategic Bombing

The concept of strategic bombardment grew out of the search for ways to avoid the bloody horror of ground force attrition warfare. In its modern form, it is an intellectually compelling, well-articulated expression of the difference between decisive and overwhelming force. That is, one of the arguments running through the growing body of literature about strategic bombardment theory is that it is possible to defeat an opponent by focusing air power on the command, control, and logistics links between enemy leaders and their forces. Near simultaneous, relatively quick, and sustained destruction of such links, the argument goes, leads to the disintegration and paralysis of an opponent's operations. And precision guided munitions, coupled with rapid, comprehensive, systematic, and accurate target acquisition and battle damage assessment make this possible.[2] The bombing campaign that can result from melding this argument to advanced military technology is an example of decisive force, as opposed to overwhelming force, since it attains war goals quickly without annihilating enemy forces.

The potential success of strategic bombing campaigns and validity of the theory supporting them are contentious, largely because many consider them an argument for shifting resources to the Air Force. While I believe such concerns are unwarranted, this is not the occasion to debate them. It is important, however, to note three fundamental points about strategic bombardment campaigns. First, whether called strategic bombardment campaigns or not, interest in bringing force to bear in the manner of strategic bombing is a key and integral part of the U.S. approach to conflict. Second, and because of this, the issue facing naval forces is not whether strategic bombing theory is totally correct but rather how best to contribute to successful strategic bombardment campaigns. Third, the answer to this question revolves around how the services operate together in conducting campaigns. Successful strategic bombing campaigns will be the product of joint operations—they will not be the purview of a single service.

the issue facing naval forces is how best to contribute to successful strategic bombardment campaigns

Moreover, what does it mean to say that naval forces ought to enable a strategic bombing campaign, and in particular what should their relationship be with the Air Force? The answer in part lies in the keys to a successful strategic bombing campaign. Two of the most important are accurate, timely intelligence on an opponent's operational scheme as well as the key command and control nodes and links through which an operational scheme can be implemented, and a judicious, efficient use of all the military assets that can attack those potential targets.

Accurate, timely, and complete intelligence is the essential precondition of a successful strategic bombardment campaign, for if the wrong targets are struck and the nodes

that are truly critical to an opponent's military operations are missed, then the tremendous potential leverage of precision guided munitions is nullified. As one Air Force manual states: "Air power is targeting, and targeting is intelligence." Many targets that become key to strategic bombing are discernible long before an opponent embarks on aggression. They are embedded in the national infrastructure, and many of them—roads, bridges, and communications towers relied upon to conduct military operations—are truly fixed targets. They don't change or move during the bombing campaign. But effective targeting depends on knowing which potential targets are important and where nodes critical to an opponent are when operations begin. That's harder. Knowledge depends profoundly on surveillance and intelligence generated before a conflict, and on the capacity, once hostilities start, to keep track of both efforts to destroy vital nodes and an opponent's efforts to overcome or circumvent our bombardment.

No single service can do this alone. The problem is too complex and demanding. It can be done jointly, however, by all force components working together to collect, process, analyze, and disseminate the necessary information. And the contribution of naval forces will be essential, for they are the most likely to be on the scene providing surveillance and intelligence before, during, and after strategic bombing campaigns. They can do this with a broad range of platforms available to them, from submarines which gather information covertly, to surface platforms which gather the entire spectrum of signals intelligence, to aircraft (manned and unmanned), and to personnel on the ground. And, tied into the nets through which other sources of information flow, they can provide on-scene intelligence and assessments which are key to effective targeting.

Judicious and efficient use of attack assets is another necessary component of successful strategic bombardment. Efficiency stems in part from good targeting—picking the key targets and destroying them when it will have the greatest effect. But this also involves getting the destructive output needed from each of the attack assets committed to the campaign. And that is a function of close coordination with supporting and participating forces.

U.S. Navy (Chad Vann)

Stealthy B–2 bombers and F–117 attack aircraft are effective, deadly, and efficient assets. Their stealth enables them to be used in areas where an opponent has heavy anti-aircraft defenses and, since they are highly survivable, the aircraft and their pilots can be employed again and again. With precision guided munitions, they can destroy virtually any target in a single sortie. But their effectiveness is even greater when they are employed with diversionary attacks by aircraft which can be provided by naval forces, when air defenses are suppressed by manned or unmanned assets such as naval attack or electronic warfare aircraft and cruise missiles, when provided with real-time target updating from naval manned and unmanned aircraft, and when it is necessary to rescue pilots which in some cases may only be possible by using naval forces in the theater.

The efficient use of attack assets also means that the strategic bombing campaign should not be limited by the vagaries of weather or by the fact that daylight erodes the stealth characteristics of aircraft like the B–2 or F–117. That is, the success of a strategic bombing campaign depends on severing many links in an opponent's command and control system more or less simultaneously, and keeping them severed for an extended period. This simply cannot be done by attacking only at night and, given that the leverage offered by stealth is greatest at night, it means other aircraft must conduct the campaign during the day. Against heavily defended targets the most effective weapon in daylight is likely to be the sea-based Tomahawk land attack missile.

Finally, efficient use of attack assets in some cases means that they should not be

diverted to air defense missions and that their overall efficiency depends on the air defense security. In the aftermath of Desert Storm there was considerable debate over the extent to which naval aviation contributed to the success of the strategic bombardment campaign against Iraq. A great deal of the discussion was narrow-minded because it focused on how many precision guided munitions were used by Air Force and Navy aircraft respectively, along with similar bean counts which missed the bigger picture. One reason Air Force tactical fighters were so effective in bombing missions, for instance, was because the Navy controlled the air space over the Gulf. If this had not been the case the Air Force would have had to divert aircraft from striking targets to air defense missions. This is the kind of synergism that often gets overlooked. It is, however, a prime example of how naval aircraft enabled Air Force aircraft to contribute to the air campaign in the Persian Gulf War.

The key to success in strategic bombardment campaigns is the effective use of precision guided munitions, which depends in the first instance on coordinated, focused surveillance and intelligence. And that is best achieved by blending capabilities from all service components with the special perspective of national space-based assets. It means practical, operational links between Air Force assets like Rivet Joint RC–135s that provide electronic surveillance and reconnaissance with similar platforms provided by naval forces like the EP–3s and ES–3s. Together, these assets can provide a better electronic map of an opponent and his forces than either can do separately. It also means tying together the tactical assets of two force components. Air Force and Navy manned and unmanned vehicles can provide a far better, more comprehensive picture of the campaign than either one operating on its own. This means coordinated planning which brings people together in the same way they do for joint war games, seminars, and day-to-day operations by second nature.

the outstanding question is what jointness means in a practical sense

Which brings me back to the central point. The question of whether joint operations are desirable has been resolved for some time. Everyone agrees that they are here to stay and should stay fundamentally because they increase the efficiency by which the Nation uses military power. The outstanding question is what jointness means in a practical sense which can be resolved only though experience—by experimentation, doctrinal development, and military exercises. But we should not kid ourselves. While the trends are favorable, we have a way to go before we can claim to have made the transition from rhetoric to reality insofar as jointness is concerned. To complete this important transition we will have to keep pushing, for making joint operations second nature to the Armed Forces means continued innovation, probable organizational changes, and a deep sense that operating jointly is the way things ought to be. JFQ

NOTES

[1] The Army provides ample references. See, for example, Gordon R. Sullivan, "Moving into the 21st Century: America's Army and Modernization," *Military Review*, vol. 73, no. 7 (July 1993), and "Projecting Strategic Land Combat Power," *Joint Force Quarterly*, no. 1 (Summer 1993).

[2] See Buster C. Glossen, "The Impact of Precision Weapons on Air Combat Operations," *Aipower Journal*, vol. 7, no. 2 (Summer 1993).

New from the

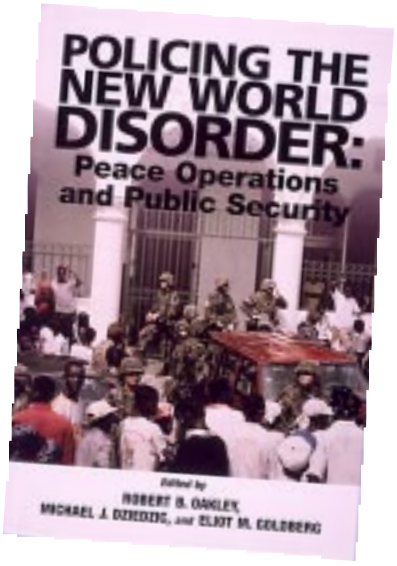
Institute for National Strategic Studies National Defense University

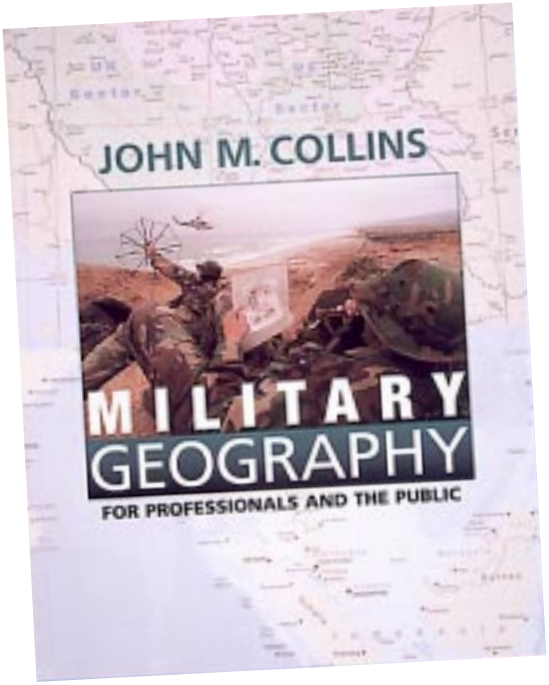
Policing the New World Disorder: Peace Operations and Public Security

Edited by Robert B. Oakley, Michael J. Dziedzic, and Eliot M. Goldberg

Published in cooperation with the United States Institute of Peace and the Carnegie Commission on Preventing Deadly Conflict

587 pp. / $27.00 ($33.75 foreign)
ISBN 1–57906–006–4
GPO stock number 008–020–01447–8





Military Geography for Professionals and the Public

by John M. Collins

459 pages, illustrated
$39.00 ($48.75 foreign)
ISBN 0–16–049405–2
GPO stock number 008–020–01439

To order the above titles, call the U.S. Government Printing Office at (202) 512–1800, or write to: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. These and many other books are available in their entirety to Internet users via the National Defense University World Wide Web (http://www.ndu.edu/inss/books/books.html).

The Limits of Jointness

By SETH CROPSEY

Cooperation like apple pie is rarely if ever questioned as a desirable thing. Unfortunately, while everyone knows what an apple pie is, fixing a military definition of cooperation is much harder. The easy response is *jointness,* but trying to define this quality produces surprisingly varied answers. By implication, legislation already written defines jointness as a diminution of the power of the individual services. In a more positive vein the Chairman of the Joint Chiefs, General Powell, sees jointness as teamwork and cooperation. Congressional ideas as expressed by the Chairman of the Senate Armed Services Committee, Senator Nunn, find jointness in the elimination of redundant weapon systems or overlapping roles and missions. And history, both ancient and modern, testifies of a nearly universal agreement that true jointness demands seamlessly linked operations between different military capabilities.

If politicians and senior officers did not use the motley definitions in this strange pail to support different policies, the task of defining jointness could safely be left to theoreticians. Since, however, jointness has attained in the defense arena the buzzword status that *justice, equality,* and of late *empowerment* enjoy in the domestic debate, it is important to be as clear as possible about what jointness is and what it is not. Failure to do so is likely to lead to an erosion of the distinctive abilities of the military disciplines from whose differences—ironically—the rationale for jointness originally springs.

The difficulty of defining jointness was apparent in the debate over the Goldwater-Nichols Department of Defense Reorganization Act of 1986. Both opponents and supporters of the legislation appealed to this elusive term to justify their arguments. The former claimed that because of the increased powers granted to the Chairman, future Presidents would lose the joint perspective provided by the expertise of other service chiefs. The legislation's proponents responded that an increase in the Chairman's power was needed to provide the jointness that was

Summary

Jointness defies consistent definition. The Goldwater-Nichols Act, the Chairman of the Joint Chiefs of Staff, the Senate Armed Services Committee, and students of operational art all view jointness differently. What will be the result of divergent, often opposing concepts of jointness? Goldwater-Nichols mandated jointness by structural reforms; General Powell sees jointness as interservice teamwork; Senator Nunn hopes jointness will be a mechanism for eliminating what he considers to be redundant roles and missions. History has shown that unified forces triumph while poorly organized ones perish. Nevertheless, General Schwarzkopf—who is lionized as an operational commander—waged joint warfare with great success, though he served in few joint assignments during his career. The summons to the services to fight as a team will be ignored by commanders at their own peril, and a joint culture may ensure that as the defense budget is slashed the services are diminished proportionately. But jointness must not eliminate the debate on the purposes and utility of the individual services that must now be conducted in the post-containment era.

missing due to the disproportionate influence of the individual services and their chiefs.

Change the Organization

Goldwater-Nichols does contain a definition of jointness, if only by negation. The legislation suggests what jointness does not mean by identifying interservice rivalry as the obstacle to it. Accordingly, the act aims at reducing the power of the services by changing military education to emphasize interservice cooperation, diminishing the control exercised by each service over careers, and increasing exposure of officers to a central staff. The 1986 landmark legislation never offered a positive model of how a more joint military would think or perform. But it did draft very firm guidelines altering service college curricula, insisted on specified qualifications for career advancement, and laid the foundation for shifting effective responsibility for acquisition of major weapons systems to the Office of the Secretary of Defense.

So comprehensive was the congressional understanding of jointness that the reorganization directly touched military officers *and* senior civilian officials. The legislation drained power from the service secretaries and gave new, broad authority to the Office of the Secretary of Defense (OSD), specifically, the Under Secretary of Defense for Acquisition. Consistent with the 30-year effort to gather authority within OSD—which does not embrace the private sector's current efforts to decentralize—the legislation's authors doubted the ability of the services to manage major programs and preferred instead to consolidate control over a $300 billion budget at the center.

Goldwater-Nichols applied the same approach to the military chain of command. Congress regarded the services as quarrelsome siblings with single, infinite appetites. It despaired at arbitrating endless contradictory claims, and sought to raise the Chairman and the Joint Staff so that they could settle disputes and unite the efforts of the unruly services. So successful was the legislation that General Powell, the first Chairman to serve his entire tour under the new law, has been able to give jointness a new meaning.

Powell has defined jointness in more positive terms than the 1986 legislation. His view is that cooperation means teamwork. Given the increasingly dismal prospects for defense funding and demands on the Armed Forces in a disorderly world, his definition also makes political sense.

In the private sector scarcity encourages thrift, drives prices up, and then usually seeks out other avenues to satisfy demand. In the Government—especially the military—dwindling budgets have traditionally stimulated a free-for-all between and among the services that rewards the bureaucratically adept and ends only when resources once again start to flow. The bitter fight over roles and missions following World War II is the most notorious example in American military history. Demobilization and postwar budget reductions were the dry tinder; President Truman's decision to pick that moment to fundamentally rearrange the services was the flame that set the pile burning.

Colin Powell has turned out to be more skillful at politics than Harry Truman. Contemplating the defense cuts at the beginning of his tenure in 1989, Powell has consistently sought to create an atmosphere of cooperation among the services that fends off divisive issues of basic structural change or reordering priorities. A measure of the stature that the Chairman's political skills have earned is a willingness to disagree with both Senator Nunn and President Clinton.

Senator Nunn asked basic questions in July 1992 about the structure of the Armed Forces, such as whether naval aviation and the Marine Corps were still required. He wondered if a single service should be placed in charge of all electronic warfare aircraft, and whether the responsibility for defending troops and installations should be consolidated under the Air Force. Echoing these difficult queries, but taking them a major step

Seth Cropsey is director of the Asia Studies Center at the Heritage Foundation. He has served as Principal Deputy Assistant Secretary of Defense for Special Operations and Low Intensity Conflict.

toward execution, President Clinton in August 1992 told the World Affairs Council in Los Angeles that:

In 1948, then Secretary of Defense James Forrestal convened a meeting of the military service chiefs in Key West to allocate responsibilities among the four services. It failed. As President, I will order the Pentagon to convene a similar meeting to hammer out a new understanding about consolidating and coordinating military missions in the 1990s and beyond.

In a draft assessment of the future of the Armed Forces, noted in the press on the last day of 1992, Powell saw no reason for sweeping changes. "Yes, we can be said to have four air forces," said the Chairman's report, "but each is different, playing a unique and complementary role."

Change the Spirit

The image of the military as a powerful organism composed of mutually dependent and cooperative groupings of cell structures has characterized General Powell's tenure as Chairman. *Joint Warfare of the U.S. Armed Forces* (Joint Pub 1), which was published in November 1991, is the clearest picture of this image. Technology, it says, has made the services increasingly interdependent. Teamwork, trust, and cooperation among the services are needed now more than ever to succeed in war. And as balance is required in the kinds of forces fielded, "there is no place for rivalry" among members of the joint team.

the need for combined operations and harmony between the different fighting disciplines has been understood—if not always practiced—since antiquity

The idea of jointness in Joint Pub 1 is politically attractive because it helps suppress dissension among the services at a time when straitened budgets are most likely to cause such quarrels. Moreover, the need for teamwork between the different military disciplines rests on unassailable operational ground. Joint Pub 1 singles out examples in American history from riverine warfare along the Mississippi in the Civil War to Douglas MacArthur's amphibious attack on the enemy's rear at Inchon in 1950. But the writers could have reached much further back into history.

In 425 B.C., the seventh year of their famous contest, the Athenians and Spartans fought over the protected harbor of Pylos on the west coast of the Peloponnesian peninsula. The Athenian command concentrated its efforts on the Spartan garrison which held out on Sphacteria, the island that guards the western approaches to Pylos. Throughout an operation that lasted over ten weeks the Athenian navy worked smoothly with heavy and light infantry, the former enforcing a blockade that hampered resupply of the Spartan detachment, the latter frontally harassing the besieged defenders. Eventually hunger helped break the Spartans' will to resist and allowed the Athenians to surprise their enemy in his fortified positions.

Two centuries later, the struggle between Rome and Carthage for power in the Mediterranean spilled over into Spain. As Scipio, the joint commander, directed a bombardment and infantry assault against the walled city of New Carthage (today's Cartagena), his naval component commander Admiral Caius Laelius launched a simultaneous amphibious attack on the city's seaward side. Diverted by these synchronized shocks, the defenders neglected their third flank which lay exposed to a shallow lake through which a Roman detachment waded and entered New Carthage. After defeating the besieged Carthaginians, Scipio offered a crown to the man who had first breached the walls. When both a marine and a centurion of the fourth legion claimed the honor, Scipio acted with great respect for what we would today call jointness. He awarded two prizes and declared that both warriors had mounted the wall at the same moment.

The need for combined operations and harmony between the different fighting disciplines has been understood—if not always practiced—since antiquity. But Joint Pub 1 takes this proven operational idea another step by arguing that the teamwork needed in battle is just as necessary throughout the military's other work, using the same language of exhortation to encourage equal harmony throughout the whole military.

DOD photo

Senator Nunn during a visit to the Persian Gulf.

Because "the arena of our potential operations is the entire planet," the Armed Forces require "the ability to project and sustain *the entire range* (emphasis added) of military power over vast distances." [1] There is "no place for rivalry that seeks to undercut or denigrate fellow members of the joint team." [2] And, "the nature of modern warfare puts a premium on cooperation with each other to compete with the enemy." [3]

For actual combat, Joint Pub 1's call to pull together is clear and cannot be disputed. However, in drawing up a concept of operations to prepare for combat or in drafting the doctrine that determines what forces will be called upon, or in choosing which weapons to build or what national military strategy to follow, the admonition to cooperate runs into problems. Reasonable men can—and do—differ about weapons systems, the appropriateness of certain missions, and the contributions of the individual services to the Nation's security.

According to Joint Pub 1, "Individual professional growth, reinforced by military education and varied service and joint assignments, leads to a refined capability to command joint forces in peace and war." [4] But the document does not claim that this combination of education and experience will answer thorny military questions, the ones that predictably draw bureaucratic blood and leave trails of nettles from the Pentagon to Capitol Hill. What does Joint Pub 1 expect when such issues arise? Should officers use teamwork and cooperation as a guide, adjusting their opinions to avoid clashes with other experts from different services?

This question is particularly relevant to still another current definition of jointness, the one noted above that has been proposed by Senator Nunn and endorsed by President Clinton. In their view the Key West agreements on service roles and missions that Secretary of Defense Forrestal and the chiefs reached in March 1948 have failed to prevent wasteful duplications of effort. As candidate Clinton said in his Los Angeles World Affairs Council speech:

I agree with Senator Sam Nunn that it is time to take a fresh look at the basic organization of our Armed Forces. We have four separate air forces—one each for the Marines, Army, Navy, and Air Force. Both the Army and Marines have light infantry divisions. The Navy and Air Force have separately developed, but similar, fighter aircraft and tactical missiles . . . . While respecting each service's unique capabilities, we can reduce redundancies, save billions of dollars, and get better teamwork.

Change the Missions

Far more radical than either Goldwater-Nichols or the Chairman's calls to join hands in battle and out, the Clinton-Nunn vision sees teamwork as the by-product of efficiency. Rationalizing the missions of the Armed Forces so that no two services perform the same job will save money first and demand cooperation second. Of the several approaches toward establishing a more unified military, the ideas supporting this one are weakest. Not because Nunn's proposal to combine such staff functions as the medical, chaplain, and legal corps are baseless. And not because his questions about the need for separate air and infantry capabilities in his Senate speech of July 2, 1992 are unworthy.

Nunn's argument fails to observe its own standards. Quoting a former Chairman, Admiral William Crowe, Nunn rightly faults the customary manner in which America has reduced its forces at "the end of a period of military crisis and the start of an era of relative peace." Proceeding backwards, the United States has cut defense first, says Senator Nunn,

and asked second how "to shape a new force in light of the changed circumstances."

However, instead of trying to peer into the years ahead or explain the lessons that should have been learned from the struggle against the Soviets, Nunn looks to the past. For him, the most important challenge in America's change of circumstances is "to provide a fighting force . . . that is not bound by the constraints of the roles and missions outlined in 1948."

Nunn, of course, is referring to the compromise by which the Office of the Secretary of Defense and the Joint Chiefs were established while maintaining a separate Marine Corps and naval aviation arm. This compromise was a political response to an idea developed by Secretary of War Henry Stimson and Army Chief of Staff General George Marshall. Deputy Chief of Staff General Joseph McNarney presented the proposal to the House Select Committee on Post-War Military Policy in 1944. Its original justification had been the lack of sufficient coordination between the Army and Navy during the war, especially just before the Japanese attack on Pearl Harbor.

the undesirability of absolute jointness—complete absorption of all the services into a single organization—should be plain since there is no serious proposal to go that far

But interservice coordination is not Nunn's first goal; he nowhere claims the lack of it as a problem. The Nunn-Clinton proposal identifies the benefit of moving beyond the 1948 agreements in terms of potential savings. Looking at air power Nunn says, "We spend tens of billions of dollars every year operating tactical aircraft squadrons in each of the four services." Noting that the Navy wants to spend from $55 billion to $75 billion on a new version of the F–18 while the Air Force plans to replace its F–16 fleet, Nunn asks whether the services could save money by cooperating together in the development of a common multirole fighter.

These questions are rooted in the desire to save costs, not in *changed circumstances*. Nunn in the end offers merely another justification for cutting defense that may or may not suit the disorderly world and American interests. It does not start out by taking deliberate aim at these vexing problems. But whatever the merits of his proposal, it does expand the definitions of jointness.

These definitions share a common, suspicious view of the services and are differentiated by their political content. Goldwater-Nichols is the least political. Knowing the military's responsiveness to hierarchy and promotion, it seeks harmony through organizational changes that tinker with power and incentives. The legislation has other effects, but it had no other end.

General Powell's emphasis on operational teamwork stands unmovably on the firm ground of experience. It is harder to say what the positive effect of his call to reproduce this cooperation at the staff level means except in broad terms of encouraging respect for the views of officers from different services. But Powell's more distant—and political—goal is to dampen the rivalry among the services that could still be an instrument of wanton dismemberment in the hands of legislators bent on extracting further *peace dividends* from the military.

Most political are Nunn's questions on duplication and redundancy. Wrapped in reflections on the changed circumstances of our time and casting back to the political tussles of the late 1940s, the queries by the Chairman of the Senate Armed Services Committee are linked by the political goal of reducing defense costs, which accounts for campaigner Clinton's support.

The Passion for Purple

There is a serious problem with this growing chorus of calls for jointness. The sense of purpose and morale, and thus ultimately the effectiveness of the services, is threatened by a calculus of their diminishing identities. The undesirability of absolute jointness—complete absorption of all the services into a single organization—should be plain since there is no serious proposal to go that far. Somewhere is a view of the services as too big and complicated to be led

easily from the center, and of their skills as too diverse to be mixed without weakening the final compound.

Unfortunately, albeit unintentionally, this is where we are headed. Ideas have been legislated, those representing the current thinking of the leaders of the Department of Defense, and those still in the planning stages, are not like a series of proposals on national health from which one must be chosen. Instead, these and other proposals will have a cumulative effect.

DOD photo by R.D. Ward

General Powell appearing before the House Armed Services Committee.

The increased time that officers spend in staff positions as a result of Goldwater-Nichols as well as the rising quality of officers who are assigned to joint billets has improved the strength of personnel on combined staffs. Of this there is no doubt. But at what price? When the system as retooled by Goldwater-Nichols produces its first Chairman and set of Joint Chiefs, will they know as much about the capabilities of their services as those who preceded them? Will the opinions they give under the most demanding circumstances to a President who has no military experience be as operationally informed as the advice of a general officer such as Norman Schwarzkopf who, until he became a CINC, had only served one tour on a joint staff? [5]

And what dislocations are being caused by the legislatively induced requirement for the Armed Forces to push a large pool of qualified officers through the relatively narrow channel of joint duty billets? Personnel detailers already talk in private both about the demoralization junior officers sense at not earning joint qualifications soon enough, and the growing pressure to exclude from joint assignments any officer who is not rated first or second among several peers in yearly evaluations. Although men like George Marshall distinguished themselves early in their careers, the genius of such other great officers as Ulysses S. Grant revealed itself later. Is the system's rational response to Goldwater-Nichols denying the Nation the talents of late bloomers? Or will the military ultimately find a way to move officers through joint duty assignments by unintentionally hamstringing the Joint Staff and the CINCs with a host of joint billets?

Neither alternative beckons. For the moment, however, one direction is clear. The current Chairman, General Powell, has used the powers of his office which were enlarged by Goldwater-Nichols, as well as his own exceptional political talents, to cultivate a spirit of cooperation among the services. Balanced reductions in forces reinforced by an inclusive approach to service assets in combat and cushioned by such educational efforts as this journal have been the order of the day.

But again, the call to jointness has some discordant notes. The need for teamwork when combined operations are required is incontestable. However, do joint assignments and education, the powerful message of documents such as Joint Pub 1, or even the Goldwater-Nichols Act itself promote such teamwork where it matters: in combat? Perhaps. But the evidence is scanty.

Joint Pub 1 paints General Schwarzkopf's victory over Iraq as a jewel in the joint crown. It quotes repeatedly and at length from all his component commanders on the virtues of harmony. But Schwarzkopf, by his own account, is a straightforward, old-fashioned Army man with little tolerance for staff life, and no warm feelings for joint duty. He speaks of his decision to accept an assignment in the Army Secretariat as ticket punching.[6] And, the "happiest day" of Schwarzkopf's tour on the staff of U.S. Pacific Command occurred when he was ordered to Germany as assistant division commander of the 8th Mechanized Infantry.[7] The Central Command commander did not trust the Joint Staff much either. Referring to slides from a briefing on Operation Desert Storm which President Bush received in Washington, Schwarzkopf told his chief of

staff, "I want them presented by you personally, not some officer from the Joint Staff." [8]

Nowhere in his popular autobiography does Schwarzkopf mention Goldwater-Nichols or the 1986 law's supposed multiplication of the CINC's power which others have touted as key to the success of U.S. arms in the Gulf War. Although he had anxious moments when Washington's requests for information made him fear that the policymakers did not wholly grasp the true picture, Schwarzkopf attributes his success in part to the freedom he was given to operate according to his best judgment and Powell's ability to run political interference.

joint tours, revised educational curricula, exhortations to cooperate, and legislation did not help—or hurt—General Schwarzkopf in the execution of his joint duties

Schwarzkopf's appreciation of jointness lacks the *diversity of approaches* and *harmony of effort* tone that characterizes Joint Pub 1, but the vacuum is filled by practical and effective action. When his order to move VII Corps into position in control of Safwan airfield was not obeyed, the CINC tells his Army component commander that unless the original orders are executed, he will give the job to the Marines. This threat helps speed action.

It fits neatly into the operational appreciation of jointness that Schwarzkopf gained in 1983 as Army advisor to Vice Admiral Joe Metcalf who led the invasion of Grenada. As Schwarzkopf tells it, when Metcalf required expertise on ground operations—as he did in planning the opposed movement of Army and Marine units across the island to free American medical students—Metcalf asked Schwarzkopf to write the orders.

However, when it subsequently became clear that a helicopter assault to release the students at Grand Anse would be quicker and less costly, Metcalf gave the order. Schwarzkopf explained the plan to the Marine colonel whose helicopters were to carry Army troops in the hostage rescue. When the colonel balked, Schwarzkopf noted that the order came from Metcalf and threatened a court martial. The matter was quickly resolved and the operation proceeded.

Joint tours, revised educational curricula, exhortations to cooperate, and legislation did not help—or hurt—General Schwarzkopf in the execution of his joint duties. When he was called on for advice, he gave his best which was very good indeed because it was based on many years of work perfecting his skill. And when he required assistance and cooperation of officers from other services, he knew how to get it.

The balance in the system which produced Schwarzkopf and such other successful unified commanders as General Max Thurman, who led the U.S. Southern Command during the invasion of Panama in 1989, was as difficult to achieve as it is easy to upset. In this equilibrium, the need for competitive ideas at the center where decisions are made about the size, shape, purpose, and mixture of forces serves as equipoise to the demand for harmonious action in battle.

Such efforts as the increasing emphasis on jointness tip the scales in the direction of concerted operational effort. However, by effectively putting a damper on conflicting ideas, they also suppress debate over such fundamental issues as the composition and character of future forces. Backed by a forceful Chairman, Joint Pub 1's insistence on *common perspectives, teamwork,* and *cooperation* delivers a strong warning against arguments, for example, that support asymmetrical reductions in U.S. forces in response to world events. Admonitions that "there is no place for rivalry" on the joint team, that the military should "exploit the diversity of approaches that a joint force provides," help establish a standard of political correctness in the Armed Forces that chokes off consideration of ideas which, while troublesome to the interests of an individual service or a particular weapons system, might be important to the Nation.

The problem is not jointness but rather what is meant by jointness. Unified effort in the field has real meaning, and there is no serious argument against this. But outside the realms of the unified commanders, the

notion becomes unclear or encourages intellectual torpor.

The medical profession's contemporary experience offers clear parallels and a constructive direction. Like officers, physicians must devote a growing portion of their time to mastering the technical demands of their art. Technological advancements in diagnostic and surgical instruments as well as the doubling of medical knowledge roughly every four years is forcing doctors to concentrate on smaller and smaller parts of the human anatomy. The body, however, is a whole, and a pathology of the optic nerve, for example, might be apparent to neurosurgeons where ophthalmologists would overlook it. The cure is to balance specific with general knowledge. In military terms, the solution to the want of a common perspective is not to exhort officers and enlisted personnel to get one, but to provide one that is based on ideas rooted in experience.

In other words, one must study history to understand the causes of military success and failure. By noting joint and combined operations throughout the text, Joint Pub 1 does acknowledge this need. But its historical lessons all teach jointness. And dependence on ratios of students from different services to determine whether a service college course qualifies as joint in the wake of Goldwater-Nichols is an obvious example of the triumph of process over substance. Military history is richer and more complicated. It shows that organizations as well as great captains can make the difference between victory and disaster. It teaches the value of thinking through tactical and strategic problems beforehand. It demonstrates the advantage of being able to swiftly change ideas, plans, and operations in the face of the unanticipated.

Jointness is not an end in itself. Nor can anyone prove that it is. Jointness is a minimal requirement for most of the imaginable situations in which this Nation would use force in the future. Apart from combat, it is a rhetorical whip that maintains a politically useful discipline among the services in a time of falling defense budgets. But the hierarchy's forceful message not to squabble also helps muffle consideration of such ideas as the unequal division of budget cuts based on national requirements or a national security strategy that may not rely on balanced forces. Unfortunately, such questions are precisely the ones to be examined. Insofar as the pressure for jointness keeps these issues at bay, the Nation is deprived of a debate it should conduct.

In *Federalist 10* James Madison, urging adoption of the Constitution, reflects on the proposed Union's ability to control the dangerous effects of political faction. "The causes of faction cannot be removed . . . relief is only to be sought in controlling the effects." Heading off controversy in the Armed Forces over basic questions on the future could eventually remove the causes of disagreements among the services by helping to strip them of their pugnacity. This would not serve America well either. It would be better to seek jointness off the battlefield in the renewed effort to understand the valuable lessons of warfare through the experiences of those who have succeeded and failed at it. **JFQ**

NOTES

[1] The Joint Chiefs of Staff, *Joint Warfare of the U.S. Armed Forces,* Joint Pub 1 (Washington: National Defense University Press, 1991), p. 2.

[2] Ibid., p. 4.

[3] Ibid., p. 15.

[4] Ibid., p. 32.

[5] Schwarzkopf quotes the reaction of his commanding officer, Major General Richard Cavazos, to the news Schwarzkopf had been ordered to the Pacific Command when he was a one-star general: "Whoever made that decision is a dumb bastard." H. Norman Schwarzkopf in *It Doesn't Take a Hero* (New York: Bantam Books, 1992), p. 214.

[6] Ibid., p. 191.

[7] Ibid., p. 221.

[8] Ibid., p. 360.

Joint Force Quarterly Essay Contest on

Military INNOVATION

To stimulate innovative thinking on how the Armed Forces can remain on the cutting edge of warfare in the 21st century, *Joint Force Quarterly* is pleased to announce the 1998–99 "Essay Contest on Military Innovation" sponsored by the National Defense University Foundation, Inc. The contest solicits contributions on exploiting technological advances in warfighting as well as on the development of new operational concepts and organizational structures. Essays may be based on either historical analyses of military breakthroughs or contemporary trends in the conduct of war.

Contest Prizes

Winners will be awarded prizes of $2,500 and $1,500 for the two best essays. In addition, a prize of $1,000 will be presented for the best essay submitted by an officer in the rank of major/lieutenant commander or below (or equivalent grades), regardless of nationality.

Contest Rules

1. Entrants may be military personnel or civilians (from the public or the private sector) and of any nationality. Essays written by individual authors or groups of authors are eligible.

2. Entries must be original in nature and not previously published (nor under consideration for publication elsewhere). Essays derived from work carried out at intermediate and senior colleges (staff and war colleges), universities, and other educational institutions are eligible.

3. Entries must not exceed 5,000 words in length and must be submitted typewritten, double-spaced, and in triplicate (no electronically transmitted contributions will be accepted). They should include a wordcount at the end. Documentation may follow any standard form of citation, but endnotes rather than footnotes are preferred.

4. Entries must be submitted with (a) a letter indicating the essay is a contest entry together with the author's name, social security account number (or passport number in the case of non-U.S. entrants), mailing address, daytime telephone number, and FAX number (if available); (b) a cover sheet containing the contestant's full name and essay title; (c) a summary of the essay which is no more than 100 words; and (d) a biographical sketch of the author. Neither the names of authors nor any personal references to the identity of the contributors should appear in the body of the essays (including running heads or other distinguishing markings such as office symbols).

5. Entries should be mailed to: Essay Contest, ATTN: NDU–NSS–JFQ, 300 Fifth Avenue (Bldg. 62), Fort Lesley J. McNair, Washington, D.C. 20319–5066.

6. All entries must be postmarked no later than June 30, 1999 to be considered eligible.

7. *Joint Force Quarterly* will hold first right to publish all entries. The prize-winning as well as other essays submitted in the contest may appear in future issues of the journal. JFQ

A 25-mile radius radar used to alert surface-to-air missiles and anti-aircraft guns.

U.S. Air Force (Scott Stewart)

The New Joint Warfare

By FREDERICK R. STRAIN

F–117A stealth aircraft on the flight line at Langley Air Force Base, Virginia.

U.S. Air Force

Successfully developing effective military capabilities is not unlike solving Rubik's Cube. If individual service assets and strengths are represented by the squares of a cube, then solving the puzzle involves long periods of adjusting military capabilities to reach the optimum configuration. In the wake of the Gulf War many believe that the Armed Forces resemble a completed puzzle, one that took decades to solve but that now fits together as tightly as the classic paradigm of a cube. What actually occurred was that the puzzle was overtaken by technological breakthroughs and the rush of world events. The result is the advent of the kind of turmoil that disrupts the established order and presents the military professional with yet another puzzle to solve.

Summary

The Gulf War not only marked a watershed in modern joint and combined operations, but also ushered in another, new type of warfare that is influenced by the course of emerging technology and the pace of world events. Like changes that have followed the development of new weapons throughout military history, doctrine and strategy are undergoing a revolution in the wake of the greatly enhanced stealth, precision, and lethality of fielded systems. As a result, commanders can anticipate that operations will almost always be joint, that distinctions between the strategic and tactical levels will blur, that new centers of gravity will emerge, and that the combat area will be more complex and difficult to delineate. These changes require redefining campaigns and campaign phasing, interdiction, maneuver, close air support, and other time-honored terms.

There have been other occasions in military history when one puzzle was supplanted by another, particularly as the result of technological developments.[1] The introduction of the machine gun, tank, airplane, submarine, atomic bomb, and ICBM all caused the Armed Forces to readjust their doctrine to meet fresh challenges. More recent innovations brought about stealth, precision, lethality, and surveillance systems that portend other revolutionary changes in military capabilities.

The United States decided to actively pursue particular technologies over the last twenty-five years to provide the Armed Forces with distinct military advantages. Even though the services worked to bring about this dramatic shift in the puzzle, many appear surprised by the outcome. This situation highlights the need to develop new doctrines and strategies that fully recognize and support the spectacular changes that have occurred. The services must dedicate themselves to solving the puzzle. We must also determine if the puzzle is still a cube or whether it has taken on another form better suited to the new environment. What are the changes in the paradigm?

Future Operations Will Be Joint

Military history is replete with accounts of campaigns and battles involving participation by only one service. In the new paradigm it is difficult to envision any point on the conflict spectrum where a single service would be committed alone. In the new joint warfare it is very likely that

- naval armadas will do battle on the high seas together with long-range bombers armed with Harpoon missiles
- operations against enemy land forces will involve sea-launched or air-launched, stand-off specialized anti-armor munitions as well as more conventional artillery
- air battles will involve theater ballistic missile defense systems launched by land forces or from off the decks of specialized naval vessels as well as the commitment of aircraft
- even relatively small, covert special operations will involve space-based communications and be supported by sea or air insertion and recovery of mission personnel.

The first postulate of the new warfare is that the services fight and operate jointly. Even lesser contingencies in the future will almost always involve materiel, C^{4}I, or transport from more than one service. Military professionals must learn to appreciate emerging service capabilities and organize, train, and equip to optimize the employment of decisive joint force.

Strategy and Tactics

Distinctions between the strategic and the tactical levels of war are no longer clear. Nowhere is this lack of clarity more pronounced than in designating weapon systems. Long-range bombers destroy ground forces along the forward line of troops as short-range fighters attack and destroy oil refineries. Army helicopters hit strategic air defense control centers as Navy cruise missiles designed for fighting nuclear wars disable electrical grids with specialized payloads. Those who remain prone to "old think" fail to recognize how technology now enables *all* combat systems and elements to become strategic or tactical depending on their intended objective.

The distinction between strategic and tactical targets is also undergoing change. Influenced by waning doctrine associated with the Single Integrated Operational Plan (SIOP) and Cold War, military planners have lost track of the fact that the distinction relates to a target's impact on the CINC's objective rather than to the nature of the target itself. Thus communication nets, fielded forces, oil refineries, and vehicles have a strategic or tactical implication depending on the desired outcome.

New Centers of Gravity

The principle of attacking key centers of gravity (COGs) to quickly achieve an objective is as old as war itself and is taught at each level of Professional Military Education. Unfortunately, traditional COGs may have little impact on the outcome of future conflicts. Global economic and informational interdependencies, for example, suggest new centers of gravity that strategists must consider. These COGs require the military to develop and exploit new ways to attack key points. Destroying or interdicting an en-

Lieutenant Colonel Frederick R. Strain, USAF, serves in the Strategic Planning Division, Office of the Deputy Chief of Staff for Plans and Operations, Headquarters, Department of the Air Force. A master navigator, his operational assignments have been in B–52 and B–1 bombers.

emy's economic infrastructure by computer intrusion may be just as valid as an approach to warfare by the year 2000 as strategic bombing is today.

Redefining the Combat Edge

Technology remains the major driving force behind the changing limits of the combat area. When soldiers lined up abreast and maneuvered with spears and shields in sweeping formations to flank an opponent, commanders needed only to primarily consider the breadth of battle. With the advent of artillery, the depth of the battle area (even on the seas) became an important consideration in the development of doctrine, strategy, and tactics. Fewer than twenty years after the first flight of the Wright brothers, the battle area had a significant, expanded vertical dimension. Most professionals recognize current technology is once again dramatically expanding the range of these boundaries. The breadth, depth, and height of the battle area now encompasses the entire globe and extends well into space. The requirement for global situational awareness is more critical than ever before.

The new paradigm points to revolutionary change in the way we think about the battle area. Time—the fourth dimension—may become the paramount factor in modern combat. Prior to the new warfare military leaders measured time (in combat terms) by weeks, months, or even years of operations. The luxury of having the time to think, plan, and react stemmed from the limitations on physical movement of combat forces. It took time for soldiers to march, vessels to transit, and aircraft to deploy, as well as for commanders to gather and assess intelligence.

the need to identify, target, and attack in near real-time is now a fact of life

Ballistic missiles, jet aircraft, hovercraft, and turbocharged light vehicles are characteristic of the new environment. As emphasized in *Joint Warfare of the U.S. Armed Forces* (Joint Pub 1), "Crises may unfold rapidly, and critical engagements may occur with little time to prepare." The commander can no longer afford the luxury of thinking in terms of days, weeks, or months to *phase* campaigns or move forces. The need to identify, target, and attack in near real-time is now a fact of life. Modern warfare demands grasping massive theater-scale operations on a minute-by-minute basis. The possibility of a potential adversary launching ballistic missiles compresses the decision cycle even further and dramatically emphasizes the point.

U.S. Navy

A Marine Corps F–18 fighter firing a Sidewinder missile.

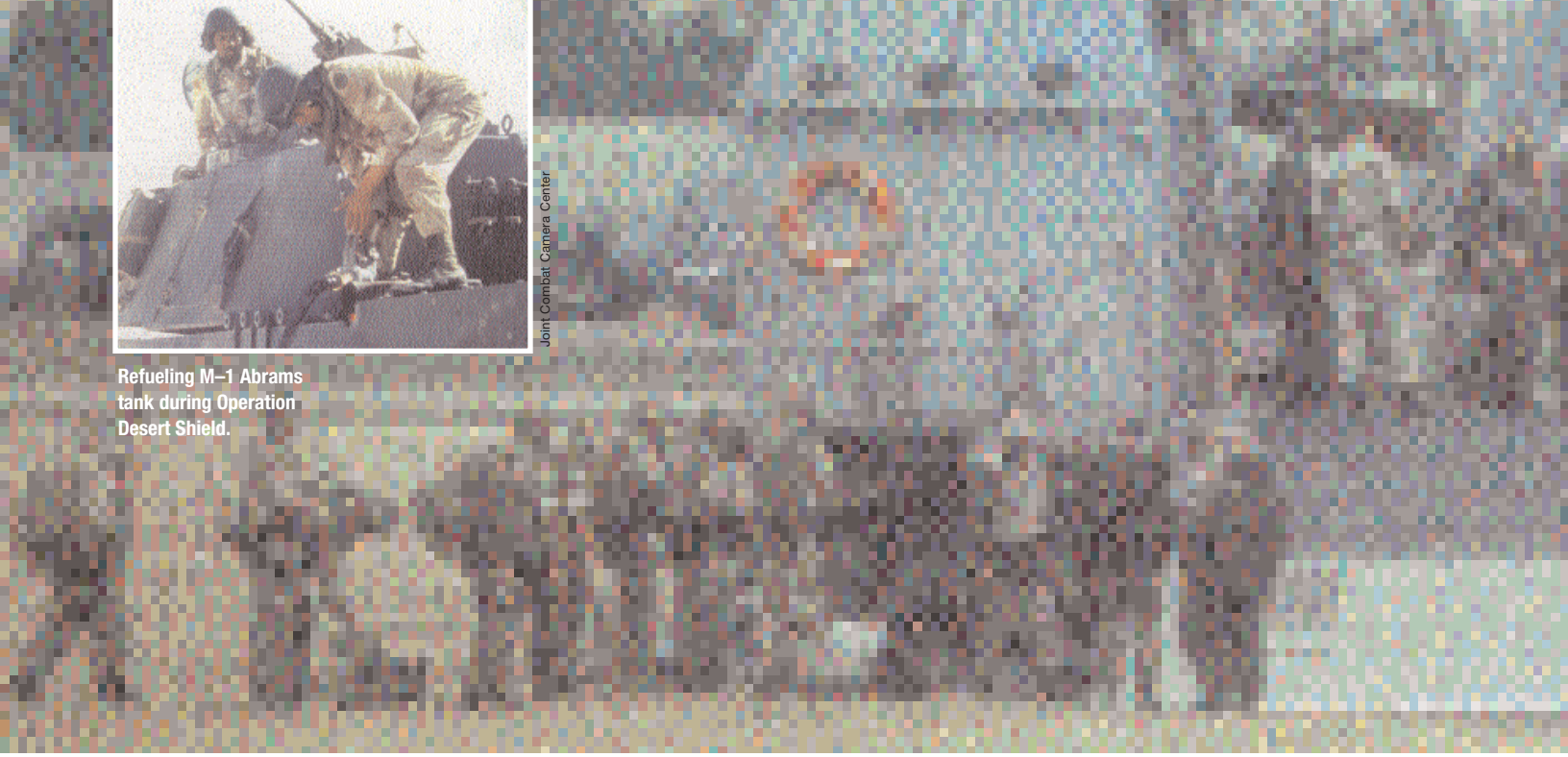
Aside from the characteristics of new weapon systems, two additional factors influence the criticality of time in the new paradigm. The growing sensitivity of the American public to combat losses suggests that civilian leaders will tend to measure future acceptable levels of U.S. casualties in *dozens* rather than *thousands* of lives. The Gulf War set a standard in this regard that could be difficult to meet in future conflicts unless certain technological advantages are pursued. In order to minimize casualties, the Armed Forces must deliver the full range of combat power quickly and decisively. Moreover, prolonged conflicts make it far more difficult to maintain political-military coalitions which are becoming increasingly important and complex in the new environment.

The New Battle Area

The ability to conduct simultaneous operations across the depth, breadth, and height of the combat area compels military professionals to change their perspective. The traditional reliance on finely drawn lines on charts must be challenged in order to fully realize the potential of emerging combat systems. Among the questions that must be asked are:

▼ Will future naval commanders responsible for destroyers with cruise missiles capable of striking ground targets a thousand miles away understand the new battle area? Will the missiles recognize Forward Support Control Lines (FSCLs) drawn on a chart or the significant maneuver by friendly forces that has occurred since launch? If not, how can combat power at the disposal of commanders be effectively advocated and integrated into useful operations?

▼ Will Army company commanders in charge of new fire systems with ranges of 200 km fully understand the integration of weapon systems into strategic targeting plans? If not, how can commanders begin to think about improving doctrine, strategy, and tactics?



Joint Combat Camera Center

Refueling M–1 Abrams tank during Operation Desert Shield.

Joint Combat Camera Center

Marines unloading a Landing Craft Air Cushion (LCAC–22) in Somalia.

New capabilities may not be able to operate within the confines of old doctrinal patterns if there is a true desire to optimize utility and exploit synergy. Joint Force Commanders (JFCs) will need new ways in the future to *undelineate* the battlefield and more effectively integrate and control service capabilities. Creative doctrines and strategies must emerge, and the vision of commanders must begin to be expanded at all levels.

Old Definitions/New Paradigm

Part of the inability of the services to fully participate in creative discussions about the new joint warfare is the inability to break with definitions belonging to the old model. Hidebound ideas that link certain terminology, weaponry, and/or services inhibit desperately needed innovation.

Campaigns and campaign phasing. Historically the term *campaign* meant a series of military operations directed by a commander in chief to achieve specific objectives. The campaign is composed of phases that match particular elements of combat power against sub-objectives. Each phase establishes the requisite environment or conditions for the next operation. Developing campaign plans designed to "peel the onion" layer by layer to get to the center of gravity is old thinking. That syndrome often crops up in doctrinal debates and is rooted in the mistaken notion that war continues to resemble giant Napoleonic battles of yore. It envisions masses of Americans fighting masses of enemy troops in bloody combat, battling their way to the enemy's capital in order to eventually convince their leaders that further resistance is futile.

The new paradigm suggests that simultaneity or what some theorists call simultaneous or parallel warfare (as opposed to serial warfare) is key to future operations. Old-style serial warfare is illustrated by the way air forces struck targets during World War II when commanders massed hundreds of bombers and dropped thousands of bombs against a single important target. The next day they did the same thing against a second target; and on the third day yet another target was hit. It did not take long before the enemy realized that on the following day a fourth target would be struck. By the tenth day the first target was repaired and operational again. Serial warfare on land, at sea, and in the air was necessary to achieve the mass needed to destroy a particular target.

The Gulf War demonstrated it is now possible to simultaneously strike hundreds of key targets through the careful integration of land, sea, and air capabilities. The result is the strategic, operational, and tactical paralysis of an enemy in a brief period of time: that ability to bring down the hammer in one gigantic crushing blow is the new joint warfare. In this respect using the term *campaign* to denote carefully sequenced activities

U.S. Navy (Kirkwasterson)

Combat information center aboard the aircraft carrier *USS Constellation.*

over a prolonged period of time may no longer be valid. The advent of parallel warfare dramatically reduces the time required to achieve objectives. The net result is that future JFCs can pursue multiple objectives simultaneously. For all practical purposes transitions between campaign phases may occur so quickly that one might consider each campaign as consisting of only a single phase. If so, are there still traditional campaigns or should a new term be coined and added to the military lexicon?

Interdiction. Impeding, hindering, or isolating by firepower (typically using short-range aviation or submarines) is the traditional form of interdiction. This old definition, however, is no longer sufficient for the new joint warfare and changing battle environment. Service capabilities now provide for interdiction by computer, electronic warfare, electromagnetic pulse, psychological operations, and a host of other emerging means of denial.

Furthermore, planners have historically viewed interdiction as a function that supports the CINC. But consider the emerging paradigm: could not technology provide interdiction capabilities so complete and effective (read *operationally paralyzing*) that an opponent recognizes the futility of continuing? That was hardly the case in World War II, Korea, or even Vietnam. The high volume of munitions required to strike individual targets—due to weapon inaccuracy—could not support effective, wide-scale interdiction.[2] If it is now becoming possible to achieve operational paralysis quickly, then interdiction could conceivably become the JFC's primary strategy.

There is also a danger in believing that interdiction is more effective if segmented or divided into geographic regions or areas of responsibility.[3] Interdiction must occur quickly and decisively across the depth, breadth, and height of the modern battle area to fully exploit its synergistic effect. This means controlling interdiction at command levels responsible for theater-wide activities. Allowing control of interdiction activities to reside at a lower echelon of command—or excluding certain capabilities because of service-unique positions—will likely result in missed opportunities and the misuse of integrated land, sea, air, space, and special operations forces.

interdiction must occur quickly and decisively across the battle area

Maneuver. A principle of war generally associated with mass movement, maneuver may become less important in the new battle area. First, being able to see the entire battle area (using JSTARS, AWACS, and emerging space systems) provides JFCs with opportunities to optimize movement. Commanders will move smaller and smaller elements of very lethal systems to counter

larger, less capable enemy forces. This will avoid wasted movement of excess force and thereby negate the need for increasingly complex logistical support. The intricate challenge of keeping fuel flowing to speeding heavy vehicles for the ground assault during Operation Desert Storm, for example, portends the problems traditional weapon systems have in the new battle area.

Second, events in the modern battle area could happen so quickly there will be scant time to react, let alone to plan and execute mass maneuver. The battle area of the future will be the domain of lighter, faster, more lethal land, sea, and air vehicles. The expanded nature of the combat area almost precludes moving traditional systems far enough and quickly enough to keep pace with the tempo of widely-dispersed geographic operations. A major challenge to future JFCs is the ability to provide real-time command and control for small, combined elements of extremely lethal forces moving throughout the battle area at breakneck speed. The famous left hook during Desert Storm (involving almost 50,000 vehicles) may have been the last major large-scale maneuver of its kind.

no single weapon or force reaches its full potential unless employed with complementary capabilities

Finally, developing long-range ground and naval fires and exploiting air-launched stand-off weapons could diminish the need to maneuver for close-in engagements as enemy ground, naval, and air forces are destroyed at greater and greater distances. Assuming strong defensive positions—as more advanced semi-autonomous weapons systems begin to dot the battle area—could be the most advantageous tactic of the future.

Maneuver in the new joint warfare focuses on maneuvering technological strengths against an adversary's weaknesses to minimize casualties and shorten the conflict. The speed, precision, and increased lethality of emerging weapons will allow commanders the opportunity to concentrate on maneuvering smaller and smaller forces: single ships instead of armadas, companies in place of battalions, and one stealth air vehicle instead of dozens of traditional aircraft.

Fire Support Control Lines (FSCLs). As mentioned previously, the notion of two dimensional lines on charts as absolute delineators of responsibility has to be revised. Traditional means of command and control cannot keep abreast with the rapid pace of operations in the new joint warfare. As attention focuses on the development and employment of smaller, lighter, faster, but more lethal weapon systems, JFCs must conceive new methods of deconflicting ground, naval, and air forces. Since the only common point of reference available to all types of forces is time (provided by synchronized space satellites), the new boundaries, perhaps drawn in time, will serve as the dividing lines of the future. Centralized command and control of targeting under the Joint Force Air Component Commander (JFACC) is only the first step in a process that must exploit new technologies. Eventually communication and computer systems should automatically deconflict combined fires and optimize target-attack sequences by sending signals across the battle area that inhibit or enable weapon systems based upon real-time feedback.

Close Air Support. Another term of art that requires revision as technology changes the battle area is Close Air Support (CAS) which traditionally meant aircraft attacking enemy ground forces in close proximity to friendly troops. The support involved both preplanned and immediate requirements, yet recently the focus tends to be almost exclusively on the immediate. An aircraft has even been designed exclusively to perform this mission. With the development of improved guidance and fire control systems, support to forces engaged close-in can be accomplished just as easily with new forms of artillery, both air- and surface-launched stand-off weapons that disperse cluster and anti-armor munitions, and emerging nonlethal technologies.

Once again each of the services can contribute to these requirements in the new battle area. The true key to success in future joint warfare is to provide forces with sufficient indigenous lethality so that immediate CAS is rarely needed. The generic term used for such support should be simply *close support* which more accurately reflects the changing nature of weapon systems that

conceivably could deliver munitions or other payloads from land, sea, or air.

These are just a few of the terms and definitions that must be recast in light of the new joint warfare. They also reveal some of the basic elements of this warfare.

Fundamentals of the New Warfare

The first basic element of the new warfare is the axiom that the whole is greater than the sum of its parts. While technology can provide unprecedented military capabilities, no single weapon or force reaches its full potential unless employed with complementary capabilities. The military professional should recognize the increasing *synergism* of modern forces. In particular, Joint Force Commanders (JFCs) must be cognizant of individual service capabilities and enabling characteristics needed to carefully orchestrate quick, decisive actions. The ability to *orchestrate* force capabilities to achieve desired results is the key to success. It does not matter if a symphony conductor once played the flute; the only allegiance is to the strength and power of the synergism.

Complementary operations are necessary for any future success. JFCs must form the team so that the appropriate players are in the line-up and ensure the game plan suits the operation. In the new paradigm, it is important that JFCs select the *key force* required to spearhead efforts. That force is the military capability with the greatest potential impact on events. This concept goes well beyond designating a particular service as the key force. In the new warfare special forces or psychological operations may have as much impact on the outcome as traditional combat elements. The key force requires full and unequivocal support from all force elements. The force designated by JFCs may vary in each new scenario.

claiming service-unique doctrinal exemptions is counterproductive to the new joint warfare

Another element of new doctrinal development is *organizing to win*. Relationships that exist only in crises have proven to be less and less effective over time. Command relationships of the past cannot be relied on to continue to work in the future. It is necessary to pioneer new command structures for peacetime as well as periods of crisis.

Conflict has achieved truly *global proportions*. It is difficult to envision any scenario affecting only the United States. Because of American troop withdrawals from around the world, conflicts will be fought at greater distances than in the past. This fact requires close cooperation with allied and friendly nations for the use of sovereign airspace, transit of waterways, and benefit of temporary basing facilities. Practically all military scenarios envision political support of allies and other international partners. Greater participation by coalitions in conflicts and operations can be expected. This puts greater emphasis on the expanding role of combined training and exercises. Not only must joint doctrine be capable of accommodating new technology and exploiting service capabilities, but it must be intelligible to both allies and coalition partners. Absent from the current debate are serious questions about improving combined operations. How would Thai forces use U.S. space assets during coalition action? How would U.S. forces exploit future Japanese assets? These are important issues for the new joint warfare.

Post-conflict operations in the new joint warfare environment are almost as important as combat itself. Protecting refugees, fostering fledgling regimes, providing humanitarian assistance, and enforcing peace accords are all necessary to ensure stability in today's world.

The Challenge for Commanders

Effective command and control of the most capable military force in history is a daunting task. Not only must JFCs completely understand the synergetic effect of an increasing range of service capabilities, but designated commanders must be enabling forces themselves. JFCs must have authority to direct all available assets at their disposal and the ability to create cohesive teams. Any attempt to undermine or dilute the principle of unity of command by claiming service-unique doctrinal exemptions is counterproductive to the new joint warfare.

Future battle within the new paradigm is more than a team effort. Most team members tend to come together and put aside their individual differences only for the big game, then they part company and revive personal animosities. Resulting friction on the sidelines eventually manifests itself on

the field, thereby denigrating the entire team's effectiveness. The challenge is to develop a force that respects the strengths of all its components and appreciates the judgment of its JFC.

The delegation of authority is one of the cornerstones of modern warfare. While it may seem at odds with the principle of unity of command, it really is an indication of the level of trust and confidence that JFCs place in the ability of their subordinate commanders to accomplish objectives.

The selection of the key force for a particular operation gets increasingly difficult, but it is nonetheless important. Decisions regarding the key force will affect many factors in the new environment. It determines reaction time, how much and what type of force to unleash, the degree of lethality to apply, how fast an adversary can be defeated, the kind of targets to attack, and the level of casualties that can be sustained. More importantly, when JFCs select the principal combat capability they determine which force will receive the priority allocation of resources.

U.S. Army (Samuel D. Henry)

Hawk missile system on an XM501 E–3 loader transporter.

The command relationships evolving from designation of the key force have come to be known as the *supported* and the *supporting* forces. The new joint warfare recognizes that these designations are not indicators of popularity. No negative connotations attach to being designated a supporting force in given operations. The supported commander must be generally able to direct the key force enabled by the complementary capabilities of other components. Such command relationships vary from one scenario to another, and even within particular operations.

Targeting in the new paradigm also deserves a fresh look. Traditional methods of selecting and attacking targets may not be effective in the emerging technological environment. The requirement to identify, target, and destroy mobile missile launchers in Operation Desert Storm suggests the kind of challenge that JFCs will face in the future. Moreover, the significance of a given target vis-á-vis the objective must be better understood. For example, destroying an industrial target as part of an effort to achieve strategic paralysis may severely affect the ability of an enemy to recover economically in the postwar period (which could have significant political implications).

Expanded intelligence gathering and analysis are critical to an economy of effort. Disabling attacks on targets, identified through careful nodal analysis, can enhance operations by strategically and operationally paralyzing an enemy. With fewer resources JFCs must be able to strike hard and fast at the correct targets, with little waste of effort. Advance analyses of key political, economic, military, and infrastructure targets are critical to reacting quickly and decisively. Furthermore, the rapid pace of modern joint operations requires the targeting cycle to have near real-time capability, with the added requirement that target data be disseminated in a form common to all forces.

Success in the new joint warfare requires each team member to recognize significant shifts in technology, appreciate the synergism of capabilities, and develop innovative doctrine and strategy to take advantage of these conditions. Undoubtedly there will be challenges that confront JFCs in the new joint warfare. But force integration is not an issue to take up on the eve of battle. It must be realized prior to a crisis by developing and adopting common joint doctrine, and also by appreciating the effort involved in once again solving the puzzle of Rubick's Cube. **JFQ**

NOTES

[1] See Anthony H. Cordesman, *Compensating for Smaller Forces: Adjusting Ways and Means Through Technology* (Carlisle Barracks, Pennsylvania: U.S. Army War College, 1992).

[2] In World War II it took 9,070 bombs dropped by an armada of B–17s to ensure a 90 percent probability of kill (PK) against a single 60-foot by 100-foot building. By the time of the Vietnam conflict, 176 bombs were required. Today it takes only one precision guided bomb to achieve the same PK. (Data courtesy of the Strategic Planning Division, Headquarters, U.S. Air Force.)

[3] For a discussion of the historical lessons learned, see Wesley Frank Craven and James Lee Cate, editors, *The Army Air Forces in World War II*, Volume 2, *Europe: Torch to Pointblank, August 1942 to December 1943* (Chicago: University of Chicago Press, 1949), p. 28 ff.

An Interview with COLIN L. POWELL

The White House

The President, Secretary, and Chairman on February 11, 1991.

THE CHAIRMAN as Principal Military Adviser

JFQ *What is your appraisal of the overall impact of the Goldwater-Nichols Act?*

POWELL I believe the implementation of the Goldwater-Nichols Act has satisfied the intent of its author—Congress—which under article I, section 8 of the Constitution has the power to make regulations for the Armed Forces.

Congress wanted to make sure that the Joint Chiefs of Staff were providing the President, Secretary of Defense, and other members of the National Security Council with good, clear, crisp, comprehensive military advice and recommendations. And they wanted to change a system whereby a committee—the Joint Chiefs—tended, they felt, to offer the least common denominator advice. Congress achieved this by making the Chairman the principal military adviser—charged to furnish direct military advice—but did not remove the responsibility of the other chiefs to provide it as well. During my tenure as Chairman, I gave my civilian

General Colin L. Powell, USA (Ret.), served as 12th Chairman of the Joint Chiefs of Staff and was the founding publisher of *Joint Force Quarterly*.

Moscow Summit, May 1988.

The White House

as national security adviser I watched the Cold War starting to end

leaders my own professional advice, fully informed by the advice and counsel I received from my JCS colleagues. When one or more of the chiefs disagreed, I made sure the Secretary and the President were aware of any differences. This is what Congress intended.

Goldwater-Nichols also clarified the lines of command and communication between the President and Secretary and the combatant commanders. CINCs are subordinate to the Secretary—he is their boss, not the Chairman or the Joint Chiefs. The act authorized the Secretary to use the Chairman as his channel of communications to the combatant commanders.

The act was also intended to improve the professionalism of the officer corps in conducting joint operations. It has certainly done that. The Joint Staff has been improved so dramatically that it is now, in my judgment, the premier military staff in the world. You can see a similar effect in the staffs of the combatant commanders. Just as important, jointness, or teamwork as I prefer to call it, has become imbedded in the culture of the Armed Forces.

JFQ *How has the Chairman's more influential role affected the balance of civilian and military authority?*

POWELL You have to remember that Goldwater-Nichols was intended to strengthen civilian control over the military by clarifying and reaffirming the role of the Secretary and his relationship with the Joint Chiefs and combatant commanders.

But to answer the question fully, you have to look beyond the legislation. The key is the relationship between the Secretary and the chiefs, especially the Chairman. The Secretary is free to obtain advice from whomever he chooses, to include his own civilian policy staff. He is obliged to receive the advice of his military leaders; but he does not have to accept it if he finds he can get better advice elsewhere or if he doesn't find it responsive to his needs.

My experience with Secretary Dick Cheney for almost four years was that he fully understood his authority over the entire Department of Defense. He used me and the chiefs skillfully to get the military advice he needed. He also skillfully used his policy staff to get it from another perspective. He was then able to blend the two perspectives. I made sure that Secretary Cheney saw the Joint Staff as his staff as well as mine.

The frequent claim that the Secretary's civilian authority and influence were reduced by Goldwater-Nichols is simply nonsense. Mr. Cheney demonstrated on more than one occasion that he was up to the task of controlling the military. Obviously, he found the advice we provided useful and relevant. To

The White House Situation Room.

The White House

suggest that somehow the Secretary is at the mercy of the Chairman and the other chiefs is wrong. The suggestion does a disservice not to the Chairman or the other chiefs but to the Secretary. The Secretary was very much in charge. And because he usually found the military advice he received useful and acted upon it, I believe the Joint Chiefs of Staff became a more influential body than it had been. To improve, to the Secretary's satisfaction, the quality of the military advice he received was what Goldwater-Nichols was all about.

The proof of the pudding is the string of successful military operations we have seen in recent years, from Panama through Desert Storm through Bosnia. The problems encountered in Grenada or Desert One, which gave such impetus to Congress to reform the process, have been largely overcome. We are not perfect, but the performance of the Armed Forces in joint operations has improved significantly and Goldwater-Nichols deserves a great deal of the credit.

JFQ *Why has this new role of the Chairman drawn such fire from critics?*

POWELL Some critics suggest that the Chairmen, especially me, did something wrong in implementing the act in the manner intended by Congress. I tried to take the act to its fullest limit. If I understand my obligation, I was supposed to faithfully discharge the law.

Many critics didn't like the law in the first place. They fought it before it was passed and are still fighting it. These critics sometimes forget that Congress enacted Goldwater-Nichols because they were deeply dissatisfied with the system of old that the critics long for. I am sure there was frustration among service staffs because the Chairman could move forward on his own. The opportunities for logrolling and frustrating progress for parochial interests were severely curtailed. We no longer had to "vote" on issues to determine what advice the chiefs were going to provide to the Secretary.

Interestingly, the chiefs seemed to have less of a problem with the role of the Chairman than their staffs and the critics. In my four years as Chairman, I worked with five different sets of chiefs. I believe they felt they were fully included in the formulation of advice. In fact the Chairman relieved them of a lot of housekeeping issues and permitted them to spend more time and energy on organizing, equipping, and training their forces, which is their principal role.

Congress and the American people have had ample opportunity over the past ten years to see how the Armed Forces are working and they are pleased. Goldwater-Nichols has been a success notwithstanding its critics.

JFQ *What is the nature of the relationship between the Secretary of Defense and Chairman under Goldwater-Nichols?*

POWELL The Chairman was given no authority under the act. He was given a role—to serve as the principal military adviser. He commands nothing. What the Chairman ultimately possesses is influence, not authority,

and only that influence which the Secretary gives him. It cannot be taken from the Secretary—he must give it to the Chairman. The Secretary does that when he believes the Chairman is someone who can get the best military advice available out of the system, someone in whom he has confidence and trust. That's ultimately what makes the whole system work. It is a system designed by Goldwater-Nichols but one executed by human beings who have confidence in each other.

And at the top of that DOD pyramid is the Secretary of Defense. There's no doubt in my mind—at least in the case of the two Secretaries I worked for, Dick Cheney and Les Aspin—that they were in charge.

JFQ *How did your experiences in senior positions in Washington help you as the first officer to serve his entire tour as Chairman under Goldwater-Nichols?*

POWELL I came to the job with a rather unique background. I had been national security adviser, deputy national security adviser, and military assistant to three deputy secretaries and one Secretary of Defense, which gave me a window on the workings of the entire Joint Staff and the Chairman's relationship to the Secretary prior to the enactment of Goldwater-Nichols. As national security adviser I also watched the Cold War starting to end. I had also commanded all operational Army forces in the United States and knew what was happening in the field. As CINC, Forces Command, I was a force provider to the overseas combatant commands. That gave me great insight into their regional warfighting plans and needs.

That experience was also enhanced by the fact that I had both personal and professional relationships with the senior members of President Bush's national security team. I was national security adviser when he was Vice President and I lived next door to him for two years in the Reagan White House. During that same period Congressman Dick Cheney was the minority whip and Jim Baker was Secretary of Treasury. So these established relationships gave me the entree that I needed to fully implement Goldwater-Nichols.

JFQ *Why under your leadership did the Joint Chiefs often meet informally?*

POWELL When former Chairman General Dave Jones and Army Chief of Staff General Shy Meyer began the debate that eventually led to Goldwater-Nichols, one of Shy Meyer's ideas was to have two groups of four stars—the service chiefs and another council of four stars detached from their service responsibilities—to serve as the real Joint Chiefs. I didn't think that was the way to go. But the idea had merit because it is hard for any service chief who has to fight for his service's interest to put that interest aside easily in discharging his role as a member of the Joint Chiefs. This is particularly the case in well-attended formal meetings where the chiefs arrive with formal service-prepared positions to defend and with their institutions watching.

So I used a combination of formal and informal meetings. We had lots of formal "tank" meetings as a group and often with the Secretary of Defense in attendance. But to use Shy Meyer's idea, I had many, many more informal meetings, just the six of us sitting around a table in my office without aides, staff, or notetakers. This was not great for history, but it was a superb way of getting the unvarnished, gloves-off, no-holds-barred personal views of the chiefs. They never shrank from defending their service views, but it was easier for them to get beyond those views when we were no longer a spectator sport. It was also easier to protect the privacy of our deliberations. We occasionally had a donnybrook but almost always came to agreement on the advice that I took forward to the Secretary. On occasion, the Secretary would join us at the little round table in my office. I am sure the service staffs were often unhappy because they didn't have their chiefs loaded with positions and wouldn't always get a complete readout.

It was a technique I found useful. Other Chairmen might choose to do it differently. I wouldn't be surprised if we met more times formally and informally than any previous sets of chiefs. I knew my approach was controversial and kept waiting to see if I had to adjust it. But I never had a single chief say, "We need to hold more formal meetings."

I might add that the secure direct hotline telephone and intercom systems we installed among the chiefs and with the combatant commanders permitted an even more informal means of consulting. We were constantly in touch and generally spoke with one voice once agreement was reached on a given issue.

JFQ *What impact did the Goldwater-Nichols Act have on the conduct of military operations?*

POWELL The invasion and liberation of Panama in December 1989 was the first full test of Goldwater-Nichols in a combat situation, although there was a partial test under Admiral Crowe during operations against the Iranian navy in the Persian Gulf in 1988. You might even say that Panama was something of a shakedown cruise for what we would be doing in Desert Shield and Desert Storm a year later.

General Max Thurman, CINCSOUTH, and one of the greatest soldiers I've ever known, created a joint task force to design the contingency plan. The plan was reviewed in Washington but not second-guessed by the Joint Staff and Joint Chiefs. It had been briefed to the Secretary. When soldiers of the Panamanian Defense Force killed an American Marine officer, we were ready and able to move quickly. I assembled the chiefs, we reviewed the situation and plan, and provided our recommendation to intervene. Dick Cheney agreed and we made that recommendation to the President after thoroughly briefing him on the plan. On the night of the operation and in the days that followed, General Thurman was given maximum flexibility to use the forces we provided him. He reported directly to the Secretary through me. Secretary Cheney knew every aspect of the plan intimately but did not insert himself into every tactical decision. I dealt with Thurman, and the Secretary watched and listened and kept the President fully informed. When we

jointness means nothing more than teamwork

Remnants of retreating Iraqi forces.

DOD

needed additional political guidance, the Secretary rapidly got it from the President. There were glitches, of course. There always are. But the model was set: we had clear political guidance, there was a solid and well-integrated plan, the CINC was in charge, and there was appropriate oversight from the Joint Chiefs and National Command Authorities. It was the model we used, scaled-up, for Desert Shield and Desert Storm and it is the model that is still in use and working very well.

JFQ *How would you assess the level of jointness during Desert Storm?*

POWELL I would assess it as excellent. It wasn't perfect. We identified improvements we had to make such as enhancing the integration of the air assets available to a CINC. We worked very hard after Desert Storm to improve our joint doctrine. Jointness means nothing more than teamwork. We have lots of star players within our Armed Forces. The trick is always to put the right stars together on a team to accomplish the team mission without arguing about who gets the game ball.

JFQ *How has the ACOM role as joint force integrator progressed in your view?*

POWELL It took us three years of debate to create the ACOM concept. We recognized that with our drawdowns around the world there would be a greater need to have jointly trained forces immediately available to deploy overseas to be used by theater commanders. Theater commanders trained their forces jointly, but we weren't doing that well enough back in CONUS. Each service trained its own forces, with only large, annual showcase exercises to train a joint force. We had to make joint training the rule and ACOM was created, in my mind, for that purpose. It was a force trainer and provider. In Haiti, it also demonstrated it could run an operation and it did it very well. We had to break a lot of bureaucratic bowls to create ACOM. We knew that it would have to evolve over time and that evolution is still going on.

We used the old Atlantic Command as the base for ACOM because with the end of the need to defend the sea lanes against the Soviet navy, Atlantic Command was a headquarters with the capacity to accept a new mission. Its location in Norfolk placed it near TRADOC, Langley, the Armed Forces Staff College, the Pentagon, Quantico, and other installations that have a role in training, doctrine, contingency planning, and education. At the time, we also left it with mission responsibility for the Caribbean so it would be a real warfighting headquarters and not just a think tank. It also retained NATO responsibilities.

ACOM finally came into being the week I retired. It was my last act going out the door. Others will have to make

Courtesy of Special Collections, NDU Library

In the field.

the definitive judgment of how well it is doing now.

JFQ *How were a new national military strategy and the Base Force concept developed?*

POWELL During the first year of the Bush administration, it was clear that the Cold War was coming to an end. We were really going to lose our "best enemy." For four decades we had a strategy, force structure, infrastructure, research and development, and investment policy that rested on the need to be ready to fight World War III. If that was going away, then what should we be ready for?

Obviously, we had vital interests in the Persian Gulf and Northeast Asia. We still needed our nuclear deterrent, and we still had force presence responsibilities around the world. And there would still be the need to fight the conflict that no one predicted or planned for. The two most demanding contingencies were the Persian Gulf and Northeast Asia. We considered these major regional contingencies. Since they were no longer linked in the sense that they were part of a worldwide Soviet threat, they could be looked at separately. We needed sufficient forces to fight each of them. It was unlikely they would break out at the same time. But we didn't want our force structure to be so thin that if we were executing one an adversary could take advantage of our weakness and start trouble in the other. The simple sizing formula was to be able to fight two major regional contingencies nearly simultaneously. We wanted the second aggressor to know that we had enough force to deal with him even though it could take a little time to get there.

The Base Force was designed to execute the new strategy. The term "base" was used to denote that we felt it was a floor below which we should not go given the world situation we saw when this was all being designed in 1990. There was quite a bureaucratic battle over what that base should be for each service, and it took some time to get everyone on board.

Both the strategy and the Base Force levels were severely criticized then and now. But they gave us something to plan on and to present to Congress, the American people, our allies, our potential enemies, and our troops as a vision for the future during a time of historic transformation. It served that purpose exceptionally well and gave us the basis to downsize our forces in an orderly way. We were determined not to be pulled apart for want of a rational strategy.

Some critics now say that strategy and force structure have outlived their usefulness. I don't think so. The strategy won't last forty years as did the Cold War strategy of "containment." But until North Korea follows the Soviet Empire into political oblivion and/or the Persian Gulf becomes a region of democracy and stability, we must still be able to respond to two MRCs. The Base Force and its successor, the somewhat smaller Bottom-Up Review force, have also ensured that we had the forces needed to deal with all the contingencies that have come

With the fleet aboard *USS Wisconsin*.
U.S. Navy (Scott Allen)

we have lots of star players within our Armed Forces

along in recent years. Lots of alternative ideas are floating around, but I haven't seen one yet that does the job better.

The roles and missions debate was seen as another way of rationalizing and downsizing the force. I conducted a roles and missions study as required by Congress and pretty much validated the existing roles and missions for our services. Some members of Congress didn't like the results because they weren't revolutionary enough and especially because they didn't point the way to even greater reductions and savings. Congress established a roles and missions commission which after a year's worth of work came basically to the same conclusion I had, although they presented some recommendations for changes in process.

Courtesy of Special Collections, NDU Library

Courtesy of Special Collections, NDU Library

JFQ *To what extent did Goldwater-Nichols empower the development of this new strategy and the Base Force?*

POWELL It gave me more freedom and flexibility to come up with ideas and move them through the system because I was able to speak in my own right and not wait for a vote of the Joint Chiefs. As it worked out, all the chiefs agreed with the strategy and the overall force structure, although there were some disagreements. In particular, General Al Gray, Marine Corps commandant, argued strongly that the planned strength level for the Marine Corps was set too low, even though the Secretary of the Navy supported that level. Secretary Cheney knew of the disagreement and made a decision. But I was not constrained in providing my recommendation while I tried to achieve total consensus or put it to the "yeas" or "nays." And by the way, Secretary Aspin subsequently raised the planned strength level of the Marines during the Bottom-Up Review.

Much credit for the strategy and force structure we came up with has to go to the Secretary's civilian policy staff. Under Secretary Paul Wolfowitz and his staff did their own analysis as they developed the Defense Guidance. Dick Cheney had a civilian policy check on what I, the chiefs, and the Joint Staff were proposing. We all got along well. It was a healthy relationship which served the Secretary's needs.

We were also able to simplify the joint planning process. We cut through a lot of the paper encrustation which had been the hallmark of the old JCS system.

JFQ *How were you able to recruit talented senior officers to the Joint Staff?*

POWELL Goldwater-Nichols helped enormously. Since joint duty credit was now needed for advancement, we became a sought-after staff. The Joint Staff was seen as a prime assignment. I also believe that it became a more exciting place to work. Panama, the Persian Gulf, new strategy, and the Base Force all served to make the Joint Staff more attractive as a cutting-edge operation. The service chiefs were very forthcoming in nominating their most able officers. We also changed the rotational process for senior staff assignments. It was no longer the "Army's turn" to get the J-3 position, etc. Or worse, to have to fill a position they didn't want to fill! Now the best person gets the job. The law required me to maintain service balance and I was able to do that without a service rotation scheme.

I was also able to get legislation from Congress that gave us billets for the three-star jobs on the Joint Staff. So now, when I asked the chiefs to nominate for one of those jobs, they didn't also have to give up one of their three-star billets. This made the jobs even more attractive and spurred competition.

JFQ *Finally, how well have the new joint officer personnel policies worked?*

POWELL From my perspective as Chairman, they worked very well. More officers than ever before are being trained in team warfare. More officers than ever have team warfare experience. This is good for the Nation and good for the Armed Forces.

I know that the policies have been very difficult for the services to manage, but they have paid off. JFQ

This interview was conducted on June 24, 1996 in Alexandria, Virginia.

U.S. Air Force

Doctrine and Education

Changing times mean changing doctrine. This is the test the Armed Forces face today. "*Joint Vision 2010* remains just an idea," Joseph Redden cautions in "Joint Doctrine: The Way Ahead." It must be defined and translated into doctrine. He outlines how both doctrine and training can address this joint warfighting necessity on the eve of a new century.

If doctrine must respond to technological change, it must also respond to challenges in the operating environment. That case is advanced by Kenneth Allard in "Lessons Unlearned: Somalia and Joint Doctrine." Muddling through is no longer an acceptable alternative. We must link what is advocated in joint doctrine to what actually happens on the ground. This entails forging a closer relationship among three basic processes: how operations are planned, how lessons are drawn from them, and how those lessons are applied to the formulation of joint doctrine.

Changing doctrine means rethinking the process by which it is developed. One imaginative approach is detailed by John Clay in "The Fifth Service Looks at Doctrine." Whereas, in the past, there were no doctrinal publications that described the unique contributions of the Coast Guard, today that service has a system of doctrine to meet new operational and technological demands.

Such changes impact on education and training. "The next logical steps in the evolution of joint professional military education will present serious challenges," according to Howard Graves and Don Snider in "Emergence of the Joint Officer." It must retain the right balance between service and joint or combined operations. Moreover, education must contribute to the moral-ethical development of officers.

Our war colleges must be the harbingers of change, according to Ervin Rokke in "Military Education for the New Age." The information age requires that senior-level professional military education institutions equip future leaders to function in a world where rapid change is the norm. We must teach a successor generation of warfighters how to deal with the unexpected. **JFQ**

Joint Doctrine: The Way Ahead

By JOSEPH J. REDDEN

EDITOR'S *Note*

Significant progress has been made in developing joint doctrine publications. The process has been shortened from four years to 23 months. Both capstone and keystone pubs have undergone major revision. The Joint Electronic Library has been expanded and made available over the World Wide Web. However, contentious issues remain in certain areas which must be resolved at service chief or CINC level. Moreover, the best hope for continued progress in joint warfighting lies in training and *Joint Vision 2010*. Yet questions have been posed about this vision—some still outstanding—with unabashed critics alleging that *JV 2010* amounts to nothing more than a string of bumper stickers.

Passage of the Goldwater-Nichols Act was viewed by some critics as "forced jointness." But the decade since its enactment in 1986 has seen us successfully engage a major regional threat with coalition allies, conduct operations around the world previously regarded as uncharacteristic for conventional military units, start to foster jointness as second nature in the officers and NCOs of every service, and take interdependence to the point where the Navy will provide key electronic warfare support for all services. This has been enabled by developing a firm doctrinal foundation, a requirements-based training system, and the emergence of a joint vision as a bridge to the future.

The joint doctrine development process is often maligned as slow and unresponsive to user needs. Unfortunately, there is some validity to that charge. In the haste to get joint doctrine to the field, the initial publications were little more than reworked service doctrine between purple covers. They were created out of need, but many were redundant or should have been published as tactics, techniques, and procedures (TTP). As Chairman, General Powell started a concerted effort to make doctrine more joint and more accessible to users. He also sought to improve the horizontal and vertical consistency of joint publications. General Shalikashvili continued these initiatives and has mandated that the publications should be more readable and distributed more quickly.

As a result, the process of developing doctrinal pubs was reduced from 48 to 23 months, in large part due to writing groups. While the lead agent approach to joint doctrine has not changed, agents are encouraged to host writing groups comprised of representatives of the services, CINCs, and joint staff directorates to draft a document that is as *purple* as possible, reducing coordination time. The new publication format has been widely accepted, and the extensive use of photos has opened new vistas for readers. To ensure that pubs get into the hands of users quickly distribution is made to the field and fleet based on lists developed by the services and CINCs.

Lieutenant General Joseph J. Redden, USAF, is commander of Air University and previously served as commander of the Joint Warfighting Center.

Capstone pubs (1 and 0-2) and keystone pubs (2-0, 3-0, 4-0, et al.) have undergone major revision. Some 84 of the projected 104 joint pubs were slated for completion by the end of 1996. The Joint Electronic Library has been expanded and is available on the World Wide Web, allowing greater access to joint doctrine, selected service doctrine pubs, terminology, and futures databases. Another significant step in the process has been inclusion of the Coast Guard as a full participant.

Seamless Training

While progress has been made in many areas, there are some contentious issues that have lingered for years which must be resolved. Two examples are Joint Pub 3-01, *Countering Air and Missile Threats,* and Joint Pub 3-09, *Doctrine for Joint Fire Support*. Both have gone through numerous drafts and working groups without major progress. Deployed forces will always find a way to make things work, but parochial interests in the system have precluded the development of joint doctrinal guidance. Without resolving these issues at service chief and CINC level, advances in joint training and the evolution of *Joint Vision 2010* may offer the best avenues for progress.

Our disposition of forces has proven costly, not least to OPTEMPO. We must ensure the readiness of forces while supporting regional engagement strategies identified as vital by combatant commanders. Progress has been made with the development of the joint training system and the emergence of U.S. Atlantic Command as joint force integrator, but there are challenges to ensuring a seamless joint training environment.

Prior to 1989 joint exercises were event-driven. Planning conferences were often opened with questions to determine what the components wanted to do, who was available to play, and what resources could be committed to the exercise. Success was based more on the number of personnel involved than on meeting jointly-agreed training goals. The line between command post and field training exercises was blurred if not indistinguishable, and deployed forces were regularly used as training aids for staffs.

The Chairman transformed joint training policy into a requirements based program in 1989. Combatant commanders were directed to articulate joint training requirements in joint mission essential task lists (JMETLs). This effort takes time and people. Those who have made the investment are seeing the benefits; those who have not continue to question the validity of the system. Stating mission requirements in terms of the capability to accomplish specific tasks under relevant conditions to meet defined standards provides a clear training roadmap. The vehicle to execute that is the joint training system (JTS).

One result of the Chairman's joint training review in 1992 was the need for a formal joint training system which was created in 1993–95, with a transition plan calling for full implementation by 1998. JTS is comprised of four phases: establishing training requirements based on JMETL, developing joint training plans to meet requirements, executing supporting events (from academic instruction to joint exercises), and assessing the effectiveness of events to meet these requirements. JTS and JMETL are flexible enough to accommodate CINC specific requirements while supporting the commonality essential to effective joint operations.

Our recent exercise experience has emphasized the need to be proactive with our friends and allies to meet requirements of multinational operations. We must mature together rather than pursuing divergent courses that may seriously degrade future coalition operations. We have seen increased interest in joint training technologies and methods by our friends and allies. There has been a shift from traditional large scale field exercises that focused on the tactical level to exercises focused on the ability of joint or multinational staffs to coordinate, synchronize, and integrate field forces. Potential JTF commanders are being educated, trained, and exercised to develop integrated land/sea/air operations that apply "the right force, at the right place, at the right time." Quite clearly, well trained joint staffs are as critical to operations as well trained forces provided by the services. Evolving training technology will continue to support specific service requirements. The flexibility it provides will also support training for a range of potential operations that will face CINCs in the future. We have made great progress in doctrine and training systems and technology to support them. However we still must determine what joint capabilities will be needed for the 21st century.

if *JV 2010* remains just an idea, it may well die a slow death from misuse and ambiguity

A New Window

In 1984 the chiefs of staff of the Army and Air Force issued a memo entitled "U.S. Army-U.S. Air Force Joint Force Development Process." This visionary document offered a framework for moving toward true jointness—not a popular concept prior to Goldwater-Nichols. Also known as the "Wickham-Gabriel 31 Initiatives," it presented a clear vision of the future but never realized its potential because of opposition from within the services and DOD. Ten years after the passage of the Goldwater-Nichols Act, we have *JV 2010*, which provides a new window of opportunity.

JV 2010 contains concepts for conducting warfare in the future. Because of the emphasis placed on this document by our military leadership, it has attracted a wide readership and attention. Many now espouse its ideas and nearly every document published in the last few months has been linked to it. A commonly asked question about the vision is how it will help achieve full spectrum dominance within the battlespace of the future, across the entire range of operations. And how will progress be measured and how will quality control be exercised over various interpretations of the vision's concepts?

If *JV 2010* remains just an idea, it may well go the way of many other "good ideas" and die a slow death

from misuse and ambiguity. That is why when *JV 2010* appeared an implementation process was initiated by the Joint Staff. This effort has also been evolving at the Joint Warfighting Center (JWFC). It has four distinct phases:

- publishing the vision and articulating it as strategic guidance
- further refining and defining the concepts
- assessing the progress being made in achieving the vision
- integrating lessons from the assessment phase into DOD systems to institute change.

The initial phase of publishing the vision and articulating it as strategic guidance was highly effective. One indicator of that success is the frequent use of the vision in both joint and service literature issued by the defense establishment. While this phase is vital in establishing operational concepts for the 21st century and laying a basis for the assessment phase, it is also dangerous if left to stand alone. *JV 2010* unfortunately has been reduced to a bumper sticker in some quarters. It is an idea that everyone appears to support but that few really understand. It was this requirement to define the vision's concepts that led to the second phase, conceptualization.

Concept definition has been underway at JWFC for many months. It has involved a group of senior active and retired officers from all four services with a wide breadth of experience. Its goal is to develop a document which will put meat to the bones of the original vision document. The first draft of this publication, *The Concept for Future Joint Operations (CFJO)*, was completed in August 1996 with copies disseminated to the CINCs, services, and Joint Staff the next month. In addition to the JWFC personnel involved in developing the document, the draft underwent extensive revisions in late 1996 and early 1997 by working groups which involved all services, representatives of the CINCs, and the Joint Staff. The preliminary coordinating draft *CFJO* was published in March 1997. This document must never be viewed as the "gospel" for future operations. It was designed as a living, breathing concept. Obviously a small group such as the one at JWFC cannot predict future warfare with total accuracy. Moreover, the concepts of *CFJO* were evaluated during a series of senior level seminars at JWFC in autumn 1996. Continued refinement will occur throughout the life cycle of the vision as new ideas and insights emerge.

Adjusting Course

The most frequent question about the vision is how one will know if we have achieved the capabilities to implement it in the battlespace of the 21st century. Phases three and four respond to this question. Phase three, assessment, is a process that will both measure movement towards the vision and enable us to adjust our course. This assessment will involve the services, CINCs, Joint Staff, and all members of the Armed Forces. A small staff at JWFC has primary coordination responsibility for the assessment effort. They will provide a common joint assessment methodology, strategy, and measures of merit for use by the joint community in the evaluation of concepts, technology, operational art, procedures, and future capabilities required to achieve *JV 2010*. Determining what to assess and developing and conducting the exercises, seminars, and events to serve as the test bed for assessments will involve the entire joint community. JWFC will facilitate the process; the services, CINCs, Joint Staff, and others will be the executors of the assessments.

_JV 2010_ has great promise for instituting changes needed for warfighting in the 21st century

One example of this process is the effort by the Command, Control, Communications, and Computer Directorate (J-6), Joint Staff, to develop a series of exercises to determine the what and how of information superiority. Working with that directorate and affected joint activities, JWFC will collect lessons from these exercises for senior level review. The lessons will then be presented to a general/flag officer working group at the Pentagon which will determine the utility of their ideas, make recommendations to the service operations deputies, and forward approved ideas to the appropriate agencies or systems for action. Responses could include action by the Joint Staff on issues such as joint doctrine or by the deputy operations deputies/operations deputies/Joint Requirements Oversight Council on ideas which will involve changes in equipment or organizations. This entire process will be under the oversight of the Joint Chiefs. Once an idea is determined to have utility by the appropriate oversight group, the integration process will begin. Integration will utilize the existing acquisition, budgeting, doctrine, and planning systems. The desired output of the implementation process is the ability to achieve full spectrum dominance on the future battlefield (the accompanying figures depict this process).

Because *JV 2010* is more than a concept, it has great promise for developing unity of effort and instituting changes needed for warfighting in the 21st century. This process involves all DOD components, does not promote parochial interests, maintains the vitality of each service, strives for joint and unified action, and allows for course corrections under the program described above.

JV 2010 is more than rhetoric. It is the tool that will help us achieve what was envisioned by the Goldwater-Nichols Act. It will allow DOD to develop the right force for the next century while involving the entire defense establishment in the process. Coupled with progress in joint doctrine and training, it will enable us to meet the challenges of an uncertain world. JFQ

Mogadishu.

U.S. Navy (Terry Mitchell)

Lessons Unlearned: Somalia and Joint Doctrine

By C. KENNETH ALLARD

As the Armed Forces prepare for new peacekeeping assignments, the lessons learned from operations in Somalia continue to have cutting-edge relevance. Some of those lessons were clearly learned and applied in Haiti, while others dominate planning for any Bosnian deployment. These specific insights are important for current and future operations, but our experience in Somalia also highlighted the enduring problem of effectively integrating joint operations. Despite the difficulties of working with the United Nations and coalition partners in a new, demanding class of missions, U.S. forces were beset by deficiencies in joint operations which persist ten years after passage of the Goldwater-Nichols Act.[1] The larger lesson of the book on which this article is based, *Somalia Operations: Lessons Learned*, is that we must forge closer links among three processes: the way we plan operations, the way we draw lessons from those operations, and the way we apply the lessons in formulating joint doctrine.

Old Lessons, New Realities

Unified command is one of the oldest problems in joint operations, but there is widespread agreement that the concepts of unity, simplicity, and operational control underpin any command structure. However, during U.N. Operations in Somalia (UNOSOM) II there were three de facto chains of command, namely, the United Nations, U.S. Central Command (CENTCOM), and U.S. Special Operations Command. As arduous as it was for CENTCOM to exercise operational control over various coequal units in a theater that was 9,000 miles from headquarters, the arrangements reflected the need to keep U.S. forces far removed from the reality or appearance of direct U.N. command. They also confirmed the relevance of standing doctrine and a lesson that should be added to Murphy's laws of armed combat: "If it takes more than ten seconds to explain the command arrangements, they probably won't work."

Another chronic problem was joint task force (JTF) organization. Even though JTFs have represented a balance between continuity of command and the integration of additional capabilities for more than fifty years, striking that balance in Somalia was a surprisingly random process. The humanitarian assistance survey team sent to coordinate the initial airlift had

Colonel C. Kenneth Allard, USA, is a senior fellow in the Institute for National Strategic Studies at the National Defense University and author of *Command, Control and the Common Defense*.

barely arrived before being redesignated as the JTF for complex and dangerous operations that lasted six months. Built around the nucleus of a Marine headquarters, the JTF that controlled United Task Force (UNITAF) gave way after a difficult transition to the hastily formed UNOSOM II staff.

The officers forming this staff had been individually recruited from Army units worldwide and only a third of them had arrived in-country by the time their mission was launched. When a JTF was added to UNOSOM II in the wake of the firefight in which

communications is the critical link in operations

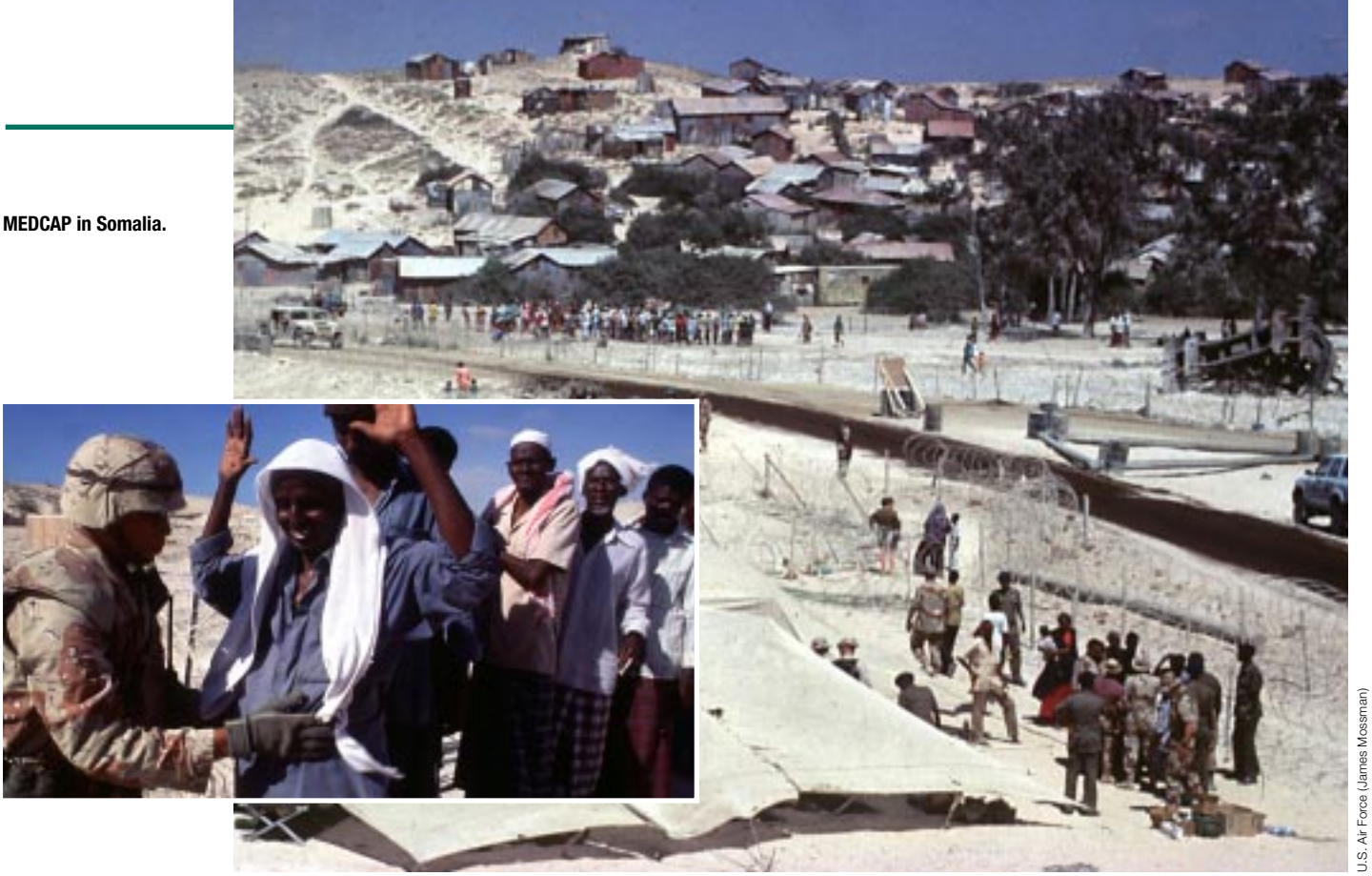
18 Americans died, the 10th Mountain Division provided the nucleus with less than two weeks from initial notification to in-country hand-off and few organic capabilities for conducting joint or multinational operations. These difficulties were overcome through dedication, hard work, and professionalism of those sent to do a tough job. But the worrisome fact is that, during the period of UNOSOM II alone, U.S. forces also engaged in a dozen other major operations that required forming JTFs—from enforcing a no-fly zone over Iraq to providing flood relief at home in the Midwest.

Communications is the critical link in operations. While no Grenada-style interoperability fiascoes arose in Somalia, there were some similarities. For example, the same series of Army and Marine tactical radios had compatibility problems because of differing modernization and upgrade cycles. For the few weeks Navy ships were offshore, the Army hospital in Mogadishu could not talk to them nor were Army medical evacuation helicopter pilots cleared to land on them. Another problem was the stovepiping of different data systems. At the height of American involvement in a country that lacked even a functioning telephone system, at least *ten* different data systems were in use. Most were built on single service requirements but handled a host of common functions: intelligence, personnel, logistics, and even finance. Each system brought its own logistical tail and competed for lane space on a narrow information highway—primarily the commercial INMARSAT satellite at a cost of six dollars per minute.

Another constant in joint operations is the planning process, especially as it influences force deployment and lift. While the joint operations planning and execution system (JOPES) forms the basis of that process, moving and sustaining the forces sent to Somalia revived the friction between the discipline needed to run the system and the flexibility demanded by warfighters. A great effort was required to reconcile bookkeeping methods for tracking Army units with the airlift deployment data to move them. Even so, telephone calls, faxes, and repeated visual checks were necessary to insure that the "ramp reality" agreed with airlift requirements in the automated data base. Similar problems afflicted sealift. Through a sad combination of rough seas, inadequate port intelligence, and delayed deployment of transportation specialists, three Army pre-positioned ships spent weeks shuttling between East African ports. Two eventually returned to Diego Garcia without unloading their cargoes, a disturbing shortcoming in an environment which was austere but not the scene of combat operations.

While Somalia certainly illustrated the persistence of old problems, it also demonstrated the continuing importance of mission analysis in adapting existing capabilities to new circumstances. Several of those innovations may serve as precedents for the future:

Rules of engagement. Though common to every operation, ROE are especially important if the objective is to limit the level of violence. Somalia had the virtue of keeping ROE simple, direct, and unclassified so that they were as well understood by the local people as by the peacekeepers.



MEDCAP in Somalia.

U.S. Air Force (James Mossman)

U.S. Air Force (James Mossman)

Disarmament. During UNITAF, peacekeepers confiscated only weapons seen as a threat to the force, for example, crew-served weapons and arms caches. Disarming Somali clans, however, was a nation-building objective of UNOSOM II. The ensuing hostilities suggest that employing forces to disarm a populace is to commit those forces to a de facto combat mission as active belligerents.

Civil-Military Operations Center. Established early in UNITAF, this center was one of the most significant innovations of the operation. An outgrowth of the standard military approach to the liaison function, it became an invaluable way of coordinating information and activities between the JTF, multinational contingents, and 49 different international agencies operating in Somalia.

Mission Creep. Although much has been written on mission creep in Somalia, it is clear that the major changes in mission and direction came from the national command authorities. The object lesson for the future is that military leaders have a critical responsibility to select milestones that best indicate mission success or failure. Many indicators in peace operations will differ from those in more conventional scenarios. But all must answer two critical questions: What is the mission and how will we know when we have accomplished it?

JULLS But Not Gems

The book, *Somalia Operations: Lessons Learned,* was principally based on those operational reports compiled through the joint universal lessons learned system (JULLS). This system has been a fixture since the mid-1980s when it was created in response to repeated General Accounting Office criticism of the lack of an automated system to evaluate joint training exercises. Administered by the Joint Staff (J-7), JULLS reports are solicited from individual participants in joint operations as well as from major headquarters and service components. Reports are reviewed by unified commands as well as the Joint Staff, usually to document remedial actions. Because it is a combination of service and joint reports linked by keywords, JULLS has a well-deserved reputation as a user-unfriendly system.

For that reason and also to look at the full scope of the operation, the Somalia archive was reduced to a hard-copy printout comprising some 200 separate reports totalling nearly 400 pages. The individual reports became more revealing as the relationships among them were tracked across all three phases of the Somalia operation: the early airlift and humanitarian assistance, the U.S.-led coalition of UNITAF, and the de facto combat of UNOSOM II that took place under U.N. control.

Although this unusual approach to the JULLS system of micro-analysis yielded some important macro-level insights, the Somalia archive also highlighted some fundamental problems in the way we collect and analyze our operational lessons:

- The JULLS system is built around individual reports that are primarily used to identify and solve specific problems. Because it is difficult to determine the linkage of these problems to larger issues solely through keyword searches, JULLS reports can be a "science of single events" unless they are related to other evidence (as actually occurred during this project).
- Individual JULLS reports range from the trivial to the profound; but because they lack specific context information or other corroborating data, it is often hard to

judge their validity. Worse, normal personnel turbulence and lengthy processing times often make it impossible to track down those who originally submitted them.

■ There is always tension between the candor needed for improvement and the perceived or actual potential for embarrassment caused by putting oneself on report. There is similar tension between the need for thoughtful review of JULLS reports as they work their way through the system and the temptation to eliminate or water down those which show commands or services in an favorable light. Reports on the de facto combat phase of UNOSOM II, for instance, were delayed for months in the case of one command as such tensions were presumably thrashed out.

the solution is to link what we say to what we actually do

These problems suggest that the JULLS system is a throwback to an era in joint operations when fault finding was studiously avoided to preserve interservice comity. Because of institutional reluctance to trace operational effects back to first causes, the system acts as an endlessly repetitive *lessons unlearned* exercise that usually resolves only marginal issues. As one jaded veteran put it: "I could take any operation we're starting next week and write the first 30 JULLS today."

Doctrinal Changes and Constants

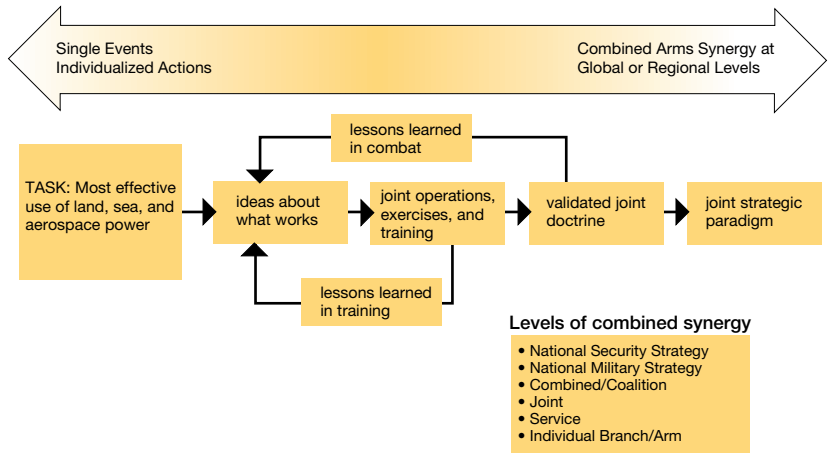
A system that concentrates on after-the-fact fixes that never seem to recur in just the same way is singularly ineffective in dealing with a constantly changing international environment. The volatility of this environment creates incentives for the Armed Forces to master the most persistent obstacles to the integration of joint capabilities. How else do we deal with chaos and adaptive adversaries than by eliminating those difficulties which we can and should control?

The solution is to link what we say to what we actually do. Specifically, it means a closer alignment of functions that often proceed independently: the way joint operations are planned and evaluated, and the way joint doctrine is validated. Such linkage is essential to subjecting new ideas on joint warfare to operational testing and rigorous analysis. The process suggested here is a more systematic approach to field testing ideas on jointness through exercises, training, readiness, and combat itself (see figure 1). Refining ideas through the operation of organized feedback loops is what will yield a body of joint doctrine validated by systematic operational testing. Although it is uncertain if this process might lead to an overarching joint paradigm as a complement to the American way of war, developing an integrated body of doctrine validated by field experience is a basic goal in itself.[2]

Current practice could not be farther from this ideal. There are 103 titles in the hierarchy of joint pubs, a staggering number considering that compiling joint doctrine did not really begin until after Goldwater-Nichols. Eye-numbing page counts further compound the problem: a new publication on noncombatant evacuation procedures is more than 200 pages. While no human could possibly read such a vast array, few would ever want to, since the writing is notoriously verbose and stilted. Yet the most precarious aspect about what now passes for joint doctrine is that it was compiled by diligently polling the usual sources—the services and other affected parties. That practice would not pose a dilemma if the results were simply taken as tentative ideas about what works and then subjected to field testing. But as matters stand, the only consistent tests are the least common denominators: brokered solutions and bureaucratic interests.

This military equivalent of political correctness contrasts sharply with the more forthright approach the Army adopted a decade ago, with compulsory after action reviews at every level of training and operations planning. While neither perfect nor painless, the process promoted candid self-improvement that eventually was imbedded in service culture. It also tied operations planning to lessons learned in a period of vigorous doctrinal experimentation—much of it aided by computer simulation and sophisticated technology. That precedent underlines what the services do best: provide laboratories to develop the basic elements of combat power. Joint institutions must now provide an essential counterpoint by searching for new ways to combine those elements—with next-generation simulations playing the role in larger combinations that they now exercise in training individual warriors. As one observer recently

The Evolution of Joint Doctrine and Strategy



Source: C. Kenneth Allard, *Command, Control, and the Common Defense* (New Haven: Yale University Press, 1990), p. 261.

noted, "It is hypothetical wars, not real ones, that will shape doctrine in the years to come."[3]

All the more reason, then, to use the analytical rigor of modelling and simulation to tackle head on the disturbing tendency in joint operations to keep making the same mistakes. Among other things, this means not putting the cart before the horse. Rather than being inflated with additional volumes of indigestible prose, the current collection of joint doctrine needs to be screened for those fundamental organizing principles which ought to guide the integrated employment of joint combat power, including criteria to decide when operations should be joint and when they can be handled by a single service. Those concepts should be tried and tested through joint exercises conceived with such specific purposes in mind. A JULLS process truly worthy of the name could play a vital role in supporting this process, much as Army after-action reviews contributed to the refinement of AirLand Battle doctrine. A new body of field-tested joint doctrine would also validate the artificial dividing lines in the current hierarchy of joint doctrine by distinguishing bedrock principles from the mass of tactics, techniques, and procedures that are part of the operational infrastructure but are far more transient. That distinction alone would be a worthwhile contribution to educating future joint warfighters, a well-understood baseline being fundamental to the virtuoso improvisations that will be expected of them in years to come.

muddling through is no longer an acceptable alternative

Shaping the Future

The ultimate expression of such a revised approach to joint doctrine might not necessarily be contained in another series of publications even if the writing and methodology were improved. The next generation of expert computer systems can significantly aid joint planning, provided that we first clarify our assumptions about linking thoughts to actions. It does not take a leap of faith to conceive of future cyber-systems serving as trusted associates to those hard-pressed humans who function as operations planners. The person in this future loop, however, would be able to draw on his own professional experience as well as artificial intelligence to reconcile unique mission requirements with joint doctrinal principles and even the most recent operational insights. In that way, current operations could be linked far more effectively to our best ideas about what works and what does not.

But future possibilities and persistent problems evoke a familiar argument: this is just the normal cost of doing business and is more than offset by a genius for muddling through, especially when the chips are down. But like many familiar arguments, this one has outlived its usefulness. There are four related reasons why muddling through is no longer an acceptable alternative:

- The international security environment will be marked by continuous discontinuities for the foreseeable future. It is a basic requirement that forces operating in this environment not only limit their vulnerabilities but also act more quickly and effectively than an adversary. In a chaotic environment, we must first eliminate self-induced disorder.
- One of the most important environmental discontinuities is technology. Whether change is seen as an ongoing military-technical revolution, a future revolution in military affairs, or a much larger revolution in the security arena, it will profoundly affect the integration of joint capabilities. Given the pace and scope of this revolution, failing to test assumptions about jointness is extremely dangerous. Basically, high tech means tighter teamwork. But often it takes a tragic mistake (such as the shoot down of the Blackhawks over northern Iraq in 1994) to highlight the inadequacies of old thinking and outmoded assumptions.
- Because this new security environment presents difficulties for policymakers, the military is being asked to do more with less. With declining force levels and budgets, there is less margin for error in what we do or how we do it. Persistent errors become vulnerabilities to be exploited by an enemy. As crises from Somalia to Bosnia already indicate, adversaries can offset military inferiority with innovative tactics that take advantage of errors on our part.
- Somalia reveals that many institutional mistakes are corrected (when the chips really *are* down) only through extraordinary efforts by junior officers, NCOs, and most of all by individual soldiers, sailors, marines, and airmen. Our senior leaders, however, have a special obligation to limit the need for such heroic efforts and sacrifices.

Senator Strom Thurmond recently defined stupidity as doing the same thing over and over while expecting different results. We should by now realize the basis of the historical problem in joint doctrine as well as the futility of expecting different results from the same muddled processes. Those with responsibility for the further development of this uniquely American joint culture might well consider what must be done to set these things right. JFQ

NOTES

[1] This article draws on the author's recently published book entitled *Somalia Operations: Lessons Learned* (Washington: National Defense University Press, 1995).

[2] C. Kenneth Allard, *Command, Control, and the Common Defense* (New Haven: Yale University Press, 1990), pp. 260–62.

[3] "The Softwar Revolution," *The Economist*, vol. 335, no. 7918 (June 10, 1995), p. 10.

General Nathan Farragut Twining, USAF

(1897–1982)

Chief of Staff of the Air Force
Chairman, Joint Chiefs of Staff

VITA

Born in Monroe, Wisconsin. Graduated from U.S. Military Academy (1918). Attended Infantry School and served as company commander, 29th Infantry (1919–22). Instructor, Air Corps Primary Flying School (1924–30). Pilot and squadron commander (1930–35). Attended Air Corps Tactical School and Command and General Staff School (1935–37). Air Corps technical supervisor (1937–40). Technical Inspection Section, Office Chief of Air Corps, and assistant executive officer to Chief of Staff of the Army Air Force (1940–42). Chief of Staff, Army Air Forces, South Pacific. Commanded 13th Air Force; 15th Air Force, Mediterranean Theater; and 20th Air Force (1942–45). Commanding General, Air Materiel Command (1945–47). Commander in Chief, Alaskan Command (1947–50). Vice Chief of Staff (1950–53) and Chief of Staff of the Air Force (1953–57). Chairman of the Joint Chiefs of Staff (1957–60). Worked for development of aircraft, missiles, and weapons. Advocated Eisenhower's policy of extensive but not exclusive reliance on nuclear weapons. Term as Chairman marked by crises in Lebanon and on Quemoy and Matsu. Played leading role in DOD Reorganization Act of 1958. Died at Lackland Air Force Base.

Courtesy of USAF Art Collection

Portrait of General Nathan F. Twining by Robert Brackman.

In 1948 the Nation's first Secretary of Defense, James D. Forrestal, ordered the Joint Chiefs of Staff to take a sabbatical at Key West, Florida, for an intellectual reassessment of roles and missions of the Armed Forces. He hoped for a solution to the increasingly ugly internal struggle for resources. Unfortunately, no such solution came from the meeting. When reduced to the actual meaning of the many words of the document, the mission of the Army was only restated to be the defeat of enemy ground forces; the Navy's was to be control of the seas; and the Air Force was charged with securing and controlling the air. These missions and their service assignments were, of course, precisely the same prior to Key West.

This redefinition of the roles and missions apparently failed to consider, or to strike at, the real core of interservice rivalry. It would seem, from agreements reached, that some fears had been expressed that one service might cannibalize another. But I don't believe that any responsible military chief of service ever actually entertained such an intention except, perhaps, as a "paper exercise." The complexities of modern war would absolutely prohibit a one-service or two-service system.

—From *Neither Liberty Nor Safety: A Hard Look at U.S. Military Policy and Strategy* by Nathan F. Twining

Patrol boat *Nunivak* off Haiti for Uphold Democracy.

U.S. Air Force (Val Gempis)

The Fifth Service Looks at Doctrine

By JOHN S. CLAY

EDITOR'S *Note*

For the Coast Guard, establishing a doctrine system is a momentous project. The thoroughgoing review of doctrine currently being conducted by the fifth service justifies serious consideration by every service. Under this examination the Coast Guard regards doctrine development as a process that standardizes how it thinks about and does its job, how it acquires dynamic feedback, and how it articulates its image as an institution. In this, the Coast Guard sees doctrine as a unifying vision. It must link its strategy and daily operations and facilitate development of acquisition requirements. This highly rational effort is thrusting our fifth service toward the desired systematic end-state.

Captain John S. Clay, USCG, is chief of the Office of Defense Operations at Headquarters, U.S. Coast Guard, and has twice commanded Coast Guard cutters.

The Coast Guard, having no doctrine command, chartered a field commanders' concept of doctrine team in 1994. Directed by operational flag officers, the team presented its findings to the commandant the following year. Common areas identified by the team as needing improvement were distilled into seven themes: unity of vision, efficiency, external links, training links, focus, unity of effort, and empowerment. These themes emerged as doctrine drivers. The team reported the need for a doctrine system and recommended that one be established. But

Port security for *USS Iwo Jima* during Desert Shield.

DOD

C–130s on flight line at Barbers Point, Hawaii.

U.S. Coast Guard

no publication describes the unique contribution of the Coast Guard

because findings by other teams (training and streamlining) were pending at the time, and the form of the Coast Guard was thus unclear, the doctrine team recommended that a focus group be appointed to develop and analyze specific options and costs of implementing such a system. The following article represents a status report on efforts by the doctrine focus group that was chartered by the commandant under the Directorate for Reserve and Training.

An inventory of Coast Guard publications and directives reveals that its current guidance is poorly organized. There is no standard approach to developing guidance throughout the service or across programs. Manuals are dated, and information and advice that logically should be included in them are often written into instructions to circumvent a cumbersome review process. Moreover, guidance is neither linked to higher level strategy nor connected to critical programs. Areas such as search and rescue, law enforcement, marine safety, and alien migration incidents are not treated in comparable ways. We have developed specific sets of guidance for each mission without looking for common ground. Operators must carry a library of manuals with them on patrol.

In addition, as the field commanders' report warned,

. . . there is no established mechanism to cycle the valuable knowledge accrued through operational experience and experimentation back to academia and training centers. . . . operational experience and experimentation tend to remain within local circles as opposed to becoming updates in the service as a whole, sub-optimizing operational procedures and preventing unity of effort.

The Current State

Organizational and system improvements occur only after failure. Lessons learned by one unit are not applied by others. How would the commanding officer of *USCGC Juniper* (the latest 225-foot buoytender) prepare for a catastrophe such as the downing of TWA flight 800? Does he know the underlying priority of people, environment, and property? Where does he seek guidance during that critical period between stimulus and response to incidents? The answers are not readily available. There is no collection of documentation that fully explains what our daily business is, how we do it, or how everything fits into an integrated system. There is no publication for internal or external consumption that describes the unique contribution of the Coast Guard to the public.

The inability to link daily business to a strategic vision also further complicates the process of generating requirements for system acquisitions. We

face the formidable task of developing a deep-water mission area analysis from scratch. The result is a series of directives, publications, and indexes that meets program needs but fails to capture the linkages and common features inherent in many of these processes. This leads to problems in both efficiency and effectiveness.

Does this mean we cannot do our jobs or that we anticipate operational failure? Not at all. But the current decremental budget environment and the reduction of 4,000 personnel is a cause for concern. Increasingly we encounter overlap among our programs in operational events such as the North Cape spill, escort of the Cuban-American flotilla, and defense operations in Haiti.

How did we get into this position? As the Coast Guard assumed more and more missions, guidance was written from a narrow, programmatic viewpoint. Time and exigency forced program managers to develop highly focused, specific guidance that gave little thought to a service strategic plan. While the guidance was often good, it failed to step outside the program's view and explain the larger impact daily actions have on the Coast Guard as a whole.

The long-term planning and budgeting process appears to drift among three main strategies: activities-based, resource based, and outcome-based. Activities-based, long-term planning focuses on missions that provide the most money in our budget. Concentrating counternarcotics operations in the Caribbean is a good example. Resource-based program managers compete for available funds for hardware. Those who promise the greatest savings may get the most money. Outcome-based, long-range planning utilizes risk assessments to formulate strategic planning. Outcomes are achieved when unit level tactics, techniques, and procedures (TTP) are linked to our strategic plan. This is the most effective way to ensure long-term resource support.

In recent years the Coast Guard, recognizing its historical ties to the defense establishment, has exploited joint and naval doctrine activities by having the unique non-redundant capabilities that it brings to national military strategy included in both joint and naval doctrine publications. Indeed, the Chairman has acknowledged the important role of the Coast Guard on his team by including the Coast Guard seal on the covers of all joint doctrine publications. In addition, the commandants of the Coast Guard and Marine Corps along with the Chief of Naval Operations will sign version 1.0 of the universal naval tasks list in which all three sea services incorporate their military operational and tactical essential tasks under one cover.

a good doctrine system will increase intellectual capital

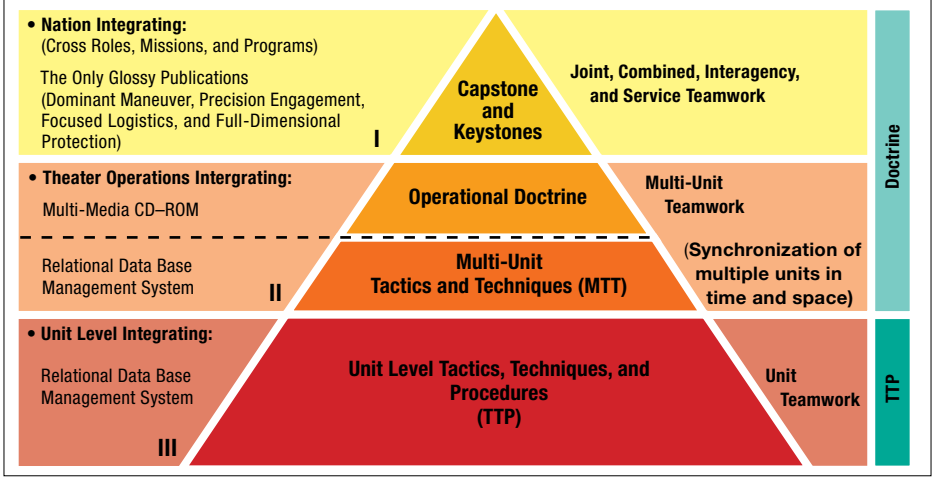
Desired State

Our vision is a system that facilitates the effective management of intellectual capital and improves the organization's speed of learning. We must replace the current stovepipe system with an outcome-based process of policy and procedures that integrates high level strategy documents and low level unit TTP. Some parts of this system are already in place, having proven their worth in several national and international crises. The focus is on developing a doctrine system to forge the horizontal and vertical links that will join these "islands of guidance" into a coherent system. We do not advance scrapping current guidance but rather seek to better organize and understand it. Simply stated, we are not trying to grow another bureaucratic arm but to connect the dots.

Doctrine can mean different things to different people. First one must understand what it is not. Doctrine is not a collection of weighty tomes designed to sit prominently on a sagging shelf. Nor is it a decree, proclaimed but never updated. It is a body of fundamental principles that guide service actions in support of national objectives. A doctrine system captures the best knowledge available about how to do things yet still accommodate judgment, innovation, and change. A good doctrine system will increase intellectual capital. The three levels shown in figure 1 illustrate such a system: level I, strategic; level II, multi-unit or force; and level III, individual unit.

Keystones are functionally derived from the capstone. The Coast Guard is currently in the process of writing its capstone together with the Center for Naval Analyses. Keystones define the way we function across other services and other Federal, state, and local organizations. Level I, national, contains strategic direction. Capstone and keystone documents translate national policy and budgetary guidance of government agencies into applicable strategic direction for our service. That direction identifies strategic policy above the Coast Guard and provides a

Figure 1. The Doctrine System



broad interpretation of how the service should implement it. The guiding principle of level I is joint, combined, and interagency teamwork to achieve national objectives.

Level II is the operational tier of doctrine where multi-unit tactics and techniques (MTT) are defined. It deals with specific movements and synchronized coordination of multiple units in time and space. At present, the closest examples of this level of guidance are portions of the search and rescue, maritime law enforcement, and marine safety manuals. The guiding principle of level II is intra-service teamwork to achieve service essential task objectives.

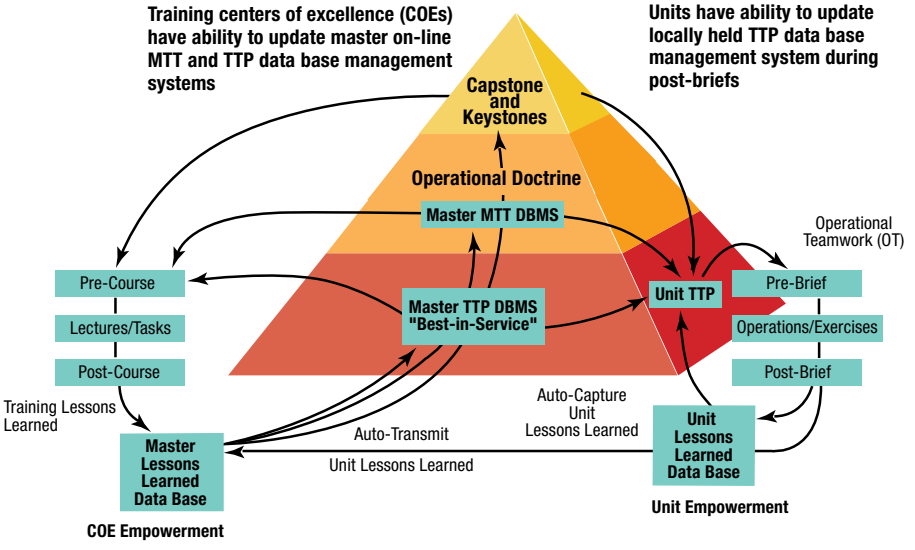
When the level of detail focuses on unit actions and tasks instead of multi-unit employment, a break is made to level III. As we transition from operational doctrine and multi-unit tactics and techniques (level II) to single-unit TTP, we no longer must operate with other units. Commanding officers are empowered and responsible for carrying out these TTP as they see fit, but consistent with service regulations and directives, safety considerations, and assigned missions. Guidance ceases to be doctrine at level III. The principle here is unit empowerment and intra-unit teamwork to achieve unit essential task objectives.

However, a doctrine system does not exist until another active ingredient is added, the near real-time feedback loops seen in figure 2. The current migration by the Coast Guard to a standard, Windows-NT based operating system, the availability of software applications, and pressing need for information sharing make this an ideal time for such an initiative. We envision a Coast Guard doctrine system in which after-action reports and doctrine/TTP lessons learned are captured during hot washups and automatically forwarded without operator intervention into an information system that permits the efficient review and updating of doctrine and "best-in-service" MTT and TTP data bases. Under such a system, lessons from Somalia, for example, extend beyond the participants. Cutters share tactics and techniques in executing a mission and strategic planners have access to a feedback mechanism based on real data.

HH–60J Jayhawk dropping litter basket.

U.S. Coast Guard

Figure 2. Real-Time Feedback Loops



The Benefits

A doctrine system is intended to achieve four objectives. First, it will standardize how we think about and do things as an institution. Since the 1980s the Coast Guard has undergone three transformations in its image. Early in that decade we were good guys. We were known for search and rescues and for helping the boating public through an extensive safety program. That image changed dramatically when our law enforcement program was greatly expanded and we earned the moniker "Smokies of the Sea." By the early 1990s our image became softer and environmentally more responsive because of our role in several highly publicized environmental crises. Two things are worth noting

U.S. Coast Guard (Steve Sapp)

Removing suspected drugs from freighter in Miami.

about these images of the Coast Guard. First, the transformations did occur and, second, they just happened. A doctrine system provides a forum for managing such changes.

Second, the doctrine system will standardize a methodology for doing the business of the Coast Guard. Without a direct link between the strategic and tactical, operators respond to crises based on whatever ad hoc knowledge and procedures are available in their immediate environment.

Third, it will provide a dynamic feedback system that allows us to capture the best methods and continuously improve, better manage our intellectual capital, and increase the speed of learning within the Coast Guard. Today we represent one of the most highly educated and trained services in American history. Countless operations are performed flawlessly every day. Given that, what does doctrine add? In a word, efficiency. Feedback loops are designed to capture new experience and innovations which furnish best-in-service data bases and an operational level doctrine library that links essential local tasks with strategic, long-term objectives.

Lastly, this system will enable us as an institution to clearly articulate the qualities, values, and principles that define the Coast Guard.

Implementation begins with developing capstone and keystone doctrine, then integrates all operational guidance to strategic level and finishes by fielding an on-line database to automatically capture lessons learned. It ensures the identification, capture, and availability of the best-in-service practices. It empowers multi-unit operational commanders to download best-in-service MTT and improve it as their own MTT, unit commanders to download best-in-service TTP and improve it as their own TTP, and training centers to automatically capture the deltas between best-in-service and modified MTT/TTP and own the process of updating and training to best-in-service MTT/TTP.

the doctrine system will standardize a methodology for doing business

The ultimate value of the system will be to create unity of purpose. It does this by directly linking strategic guidance to practical, day-to-day operations. It integrates prevention and response processes regardless of the mission and establishes horizontal and vertical linkages for guidance. It considers the unit people on-scene as key elements of the strategic process by empowering them to own TTP and automatically capturing their changes for consideration in future updates to TTP, MTT, and higher level guidance.

Finally, such a doctrine system is necessary in order to obtain the information superiority described in *Joint Vision 2010*.

Since the commandant's doctrine focus group has not completed its work, it is premature to speculate on options and potential costs; but as this article goes to press the results will likely have been briefed to both the chief of staff and the commandant of the Coast Guard. The bottom line is that the doctrine focus group confirmed the findings of the earlier work by the field commanders' concept of doctrine team, added value, and will recommend a doctrine system for the Coast Guard. If approved by the commandant, this effort will be expanded to include other critical constituencies within the Coast Guard and focus on a detailed implementation plan with cost estimates. **JFQ**

Look for Joint Force Quarterly *on the Joint Doctrine Web Site*

http://www.dtic.mil/doctrine

http://www.dtic.mil/doctrine/jel/index.html

http://www.dtic.mil/doctrine/jel/jfq_pubs/index.htm

For more information about the Joint Doctrine Web Site, contact the Joint Doctrine Division, Operational Plans and Interoperability Directorate (J-7), at (703) 614–6469 / DSN 224–6469.

U.S. Navy (Jeffrey Viano)

Emergence of the Joint Officer

By HOWARD D. GRAVES *and* DON M. SNIDER

Both the form and substance of professional military education (PME) have been subjected to basic and revolutionary reforms in recent years. The farsighted Goldwater-Nichols Act, though hotly debated and strongly resisted at the time of its passage, mandated and catalyzed this change. Initially the law had little appeal to the military departments. Today each service accepts, indeed embraces, these reforms because their contribution to the effectiveness of joint warfare outweighs the new burdens which they have admittedly placed on the services.[1]

PME reforms were the result of two profound and complementary thrusts found in title IV of Goldwater-Nichols that dealt with officer personnel policy. The first, which addressed form or process, created joint specialty officers (JSOs) and imposed criteria for their selection, education, utilization, and promotion. The second, one of substance, revamped the content of military science as it applies to the education of JSOs through its focus on emerging joint doctrine.

Recalling that the military is defined, as well as delimited, by its expertise in military science and that this expertise is an intrinsic part of the self-concept of the officer corps and its relationship to the state, it is easy to see the prescient mutual significance of these two new thrusts in PME. Together, they have produced joint officers of a kind rarely before found in our military institutions and culture. Some

Lieutenant General Howard D. Graves, USA (Ret.), served as superintendent of the U.S. Military Academy where Don M. Snider is currently the Olin professor of national security studies.

may disagree with this characterization by pointing out that Goldwater-Nichols only defined new duty positions and educational requirements. But they misunderstand the revolutionary nature of what has occurred in the joint arena over the last ten years—the clear emergence of a new culture among the leaders of the Armed Forces.

This new culture is truly joint. It is evidenced in the experiences of officers who have been educated and served in joint billets, many during operations in Panama, the Persian Gulf, Somalia, Haiti, and Bosnia.[2] The reforms introduced under Goldwater-Nichols are not the sole cause of this emerging joint culture, but they were vital in facilitating the learning experience through which it is being nurtured.

Joint culture continues to emerge. Its ultimate impact on the individual services is not yet fully known, nor is the ethos it advocates. One outcome appears certain: the next logical steps in the evolution of joint PME will present serious challenges. As we face them, it is vital—especially for younger officers—to recall that the Armed Forces successfully adapted to new realities under title IV of the Goldwater-Nichols Act.

Influences on PME

The principal changes brought about in joint PME under Goldwater-Nichols include actions that:

- established the Chairman as principal adviser to the President and Secretary of Defense on all military issues including PME (previously the domain of the corporate JCS)
- defined "joint matters" for educational and other purposes as relating to the integrated employment of land, sea, and air forces in the areas of national military strategy, strategic and contingency planning, and command and control of combat operations under unified command, whereas before they were not clearly defined and traditionally included only joint planning
- created a JSO career track to improve the quality and performance of officers assigned to joint duty; mandated that critical positions identified in joint organizations be filled only with JSOs contingent upon their completion of joint PME
- mandated maintaining "rigorous standards" at joint PME institutions for educating JSOs, where previously there had been neither joint educational programs nor required standards
- mandated promotion policy objectives for officers in joint duty assignments, objectives directing that as a group these officers should be promoted at a rate comparable to officers serving on service staffs in the military departments
- required newly promoted flag and general officers to attend the Capstone course, which is designed specifically to prepare them to work with all the services
- designated a PME focal point in the vice director, Operational Plans and Interoperability (J-7), Joint Staff, who is dual-hatted as the deputy director, Joint Staff, for military education and oversees the Military Education Division (J-7).

Moreover, a program for joint education has evolved into a PME framework which relates five educational levels to career phases (namely, precommissioning, primary, intermediate, senior, and general/flag officer), each with its own mandated learning areas and objectives.[3]

the next logical steps in the evolution of joint PME will present serious challenges

These provisions, with others too numerous to detail here, linked assignments, education, and promotion potential to joint duty. The law had remarkable effects on service policies relating to professional development. The services had to adjust traditions, particularly the convention that officers did not serve outside their service nor their tight-knit career specialty lest they fall behind their contemporaries who remained in the service's mainstream.

To effect change in the services, Goldwater-Nichols needed to define the nature of joint officer development and create institutional incentives sufficient to promote its ultimate legitimacy.[4] As indicated, it did this initially by linking assignments, education, and later promotion potential. In subsequent years, the effectiveness of joint combat operations has been even more powerful in persuading officers that joint duty is both personally fulfilling and career enhancing.

Institutional Costs

The services have adapted to the new realities of Goldwater-Nichols, but not without costs. The requirement to assign promising officers to joint billets who otherwise would receive positions which their service deemed important to its own missions has complicated personnel management. The increased quality of officers serving in joint assignments resulted in a corresponding decline in the overall quality of service headquarters and operational staffs, a cost more quickly recognized by some services than others. Further complications have arisen over the time officers spend outside their services for joint PME and in joint duty assignments, which in many cases now approaches 20 percent of professional careers.

The third cost has been an unrelenting increase in the number of joint billets, more than 10 percent over the last six years alone, a period in which the services markedly reduced their strength in officers. Lastly, inflexibility in managing JSO assignments and increased turbulence because of the requirement to attend phase II of the program for joint education (PJE) during twelve weeks in residence at the Armed Forces Staff College constitute ongoing costs to the services.

Notwithstanding their expense, these reforms have been so fruitful that on balance the result has been the emergence of a new joint culture. America's evolving approach to warfare, which is increasingly joint in all respects, has been supported, even led and facilitated, by officers professionally educated and employed under Goldwater-Nichols.

Ultimately, the benefit of PME reforms must be measured against the performance of the Armed Forces in defending and furthering national interests. In this case the record is clear: better officers, better prepared for joint force employments, with markedly better results in integrating service capabilities on the battlefields and in regional conflicts.

With so much successful adaptation over the past decade, is joint PME now established for the decades ahead?

If not, what issues should occupy those responsible for preparing officers for joint duty? Two broad sets of ongoing changes in the security environment create challenges for designers of joint PME. The first relates to future missions of the Armed Forces—those purposes for which the Nation will employ the military in the next millennium. The second centers on the response of Western democracies, including the United States, to a new security environment and its implications for civil-military relations.

Future Missions

With respect to missions of the future, it would appear that within the residual, state-centric international system, conflicts among major powers will be the exception.[5] But nonstate actors have increasingly created capabilities which endanger U.S. and allied interests in widely separated regions. Threats exist along two vastly different segments of the conflict spectrum: at the low end with operations other than war (OOTW), and at the high end—beyond conventional war as seen in regions like the Persian Gulf—through the proliferation of weapons of mass destruction (WMD), some potentially to nonstate actors. Recent OOTW missions which have involved joint forces—in Somalia, Haiti, Rwanda, Bosnia, Liberia—contrast sharply with the focus of the Cold War era and the regional conflict in the Gulf that immediately followed it. But in fact they have been the normal missions of the Armed Forces save for the historical anomaly of the Cold War.[6]

The need to be prepared for vastly contrasting missions—from OOTW to regional war with WMD or a return to major power competitions—poses significant challenges for joint PME. First, since OOTW missions do not usually involve our vital interests (with the exception of international terrorism), the polity will expect them to be achieved without casualties and other costs which are not commensurate with the significance of those interests. Thus these missions must be conducted swiftly and efficiently, with even a higher premium on pre-conflict integration of service capabilities and joint training readiness. Furthermore, they are likely to have limited objectives and be of short duration, creating the aura of constabulary missions.[7]

The tensions within these evolving missions already are, and will continue to be, quite real for officers. Will core competencies and self-concepts be focused on the role of the warrior or on that of the constable and peacekeeper? Most OOTW missions have also called for decentralized mission execution. This dispersion requires greater political-military sophistication in younger officers, to include direct contact with the media, non-governmental organizations, and foreign governments, as well as coping with the inherent ambiguities and complexities of such international operations.

55th Signal Company, Combat Camera (Brian Gavin)

Medics carrying wounded Haitian.

will core competencies be focused on the role of the warrior or on that of the constable and peacekeeper

Such missions also require officers of exemplary character since the ambiguities and complexities of international operations often have a moral-ethical character, and joint commanders must work with foreign officers whose culture and institutions reflect a different value orientation.

Since the Nation will always rightly expect that its Armed Forces be prepared across the full spectrum of potential conflict, the success of future adaptations of joint PME may well depend on how this dilemma is resolved. The challenge will consist of further developing competencies for new, limited missions while enhancing joint warfighting—a daunting task given the likelihood of continuing resource constraints. This brings us to the second set of ongoing changes that will influence joint PME—the nature of the responses by democratic governments, including the United States, to changes in security imperatives.

A New Environment

Democratic responses can be aggregated into four areas, each diverging sharply from the patterns of the past five decades, and with some quite important differences between America and its allies. First, the resources being allocated to national security have been sharply reduced and will remain so until a new threat to our vital interests emerges for which elected governments can extract the necessary resources from internally oriented publics.[8] Coupled with the requirement for political legitimacy in the use of military force, as observed in the Gulf War and Bosnia, this means that Western democracies will fight future conflicts with political-military coalitions.[9]

Secondly, unlike the Cold War era of long-standing coalitions, the future norm will consist of ad hoc and conditional commitments by democratic governments, again as seen in the Gulf War and recent OOTW missions. The implications for joint PME are clear. For every joint concept, doctrine, or course, the United States must develop

The Desirability of Joint Duty—1982

Joint assignments are seldom sought by officers. A joint position removes them from the environment for which they have been trained, in which they have established relationships and reputations, and in which they seek advancement. It places them instead in a wholly new environment involving unfamiliar procedures and issues for which most of them have little or no formal training. Their fitness reports (which affect their careers and prospects for advancement) are often entrusted to officers of other services with little in common by way of professional background.

Adding to these concerns is the perception that much of the work on the Joint Staff is unproductive, and that too much effort is wasted on tedious negotiation of issues until they have been debased and reduced to the "lowest common level of assent."

The general perception among officers is that a joint assignment is one to be avoided. In fact, within one service it is flatly believed to be the "kiss of death" as far as a continued military career is concerned. In contrast, service assignments are widely perceived as offering much greater possibilities for concrete accomplishments and career enhancement. As a result, many fine officers opt for service assignments rather than risk a joint-duty assignment. Yet joint positions have the potential for making major contributions to the defense effort, and offer challenging work to the finest officers.

—Chairman of the Joint Chiefs of Staff Study Group,
The Organization and Functions of the JCS (1982)

parallel combined capabilities in concert with its allies. Those responsible for joint PME should urgently consider the profound implications of the rapid internationalization of U.S. military institutions and processes.

The third response is the evolving specialization in U.S. military capabilities vis-à-vis those of our allies. Basically, Washington has indicated its intention to maintain a high-tech competitive advantage—in pursuit of a revolution in military affairs (RMA)—whereas other nations, with the possible exception of France and Japan, have eschewed such a role. Unfortunately, any intention to adapt and reshape the Armed Forces through an RMA is unresourced as yet. Further, developments to date indicate an asymmetric application of RMA capabilities across the conflict spectrum, with few benefits for OOTW, currently the most frequent grounds for employing joint capabilities.

Since joint PME operates at the intersection of intellectual development and operational art, adapting to an RMA requires the formation of officers who are analytic, pragmatic, innovative, and broadly educated.[10] History teaches that effective PME—though insufficient by itself—has proven to be necessary for military innovation, experimentation, and adaptation. This resulted primarily when PME provided the dual benefits of training in new factual knowledge as well as influencing officer attitudes and perceptions toward fundamental shifts in military doctrine and organization.[11] But the success of such investments in human capital is problematic at best given the political clout of congressional-industrial interests that favor spending on defense hardware and software. Thus, only at senior levels where the civilian and military leadership make these trade offs can the specific challenge from a potential RMA to joint PME be met.

In the fourth area of response, our allies have significantly reshaped their force structures, in some cases even making changes in reserves and conscription, although America has done little. The most notable examples are Britain and France, who have extensively reduced and reorganized their militaries. France even announced the end of obligatory national service.

Collectively, the implications of these responses for PME—at service, joint, and combined levels—are ominous. Just as role specialization, a potential RMA, and sharp declines in resources are making adaptation, innovation, and reshaping more critical to military institutions—processes historically facilitated by PME—the Armed Forces are heavily engaged in missions for which they are relatively least suited, consuming even greater shares of declining resources. This is more true of the most critical asset for change: the focus of senior military leaders.[12] Thus, unless resourced and nurtured by them, PME may regress from the notable strides made under Goldwater-Nichols.[13]

Overarching Challenges

Regardless of which future unfolds, those responsible for PME will face two transcending and thus key challenges. The first is retaining the right balance between service and joint/combined PME. The second and more important is maximizing the contribution of joint PME to the moral-ethical development of officers.

At the "point of the spear" in joint warfighting are service capabilities that enable the Armed Forces to conduct land, sea, and air operations in successive and successful battles. Developing and educating officers in the integrated employment of these capabilities, joint or combined, should not serve to diminish core service capabilities. PME should not become too joint. If it does, the profession of arms could be criticized for "majoring in minors." Calls for substantial amounts of joint education down to the precommissioning level, among other initiatives, could rapidly lead to that point. By contrast, service culture and interservice competition, especially on the tactical level, are constructive aspects of maintaining an effective defense establishment.[14]

Of course such competition at higher levels has occasionally gotten out of bounds, such as when constrained resources inflame it, and perhaps could once again. On the other hand, officer education is not the most effective method to deal with perceived excesses in interservice rivalry. Effective civilian leadership, which can easily channel such competition to constructive adaptations and innovations, is a more appropriate corrective.

Civilian leadership cannot, however, effectively address the second challenge. The moral-ethical dimension of military service, vital in educating officers, is inherently part of the "contract" that the Armed Forces have maintained with the Nation. Were the

military to abrogate that pledge, as recent actions by a few officers have demonstrated, it would cease to be a profession. It would become unattractive to those who might wish to serve and unsupported by those it is dedicated to protect. Furthermore, and aside from this contract, officers have always had to act with integrity and trustworthiness. Such attributes will remain a functional requisite to mission accomplishment in a profession that unleashes violence as a team, with each member subject to unlimited liability.

As noted, OOTW test such trustworthiness early in an officer's career. Therefore at a time when individual character is becoming less central to the society which professional officers serve, it remains of unrelenting importance to them regardless of grade or assignment. To meet that need, all services are making serious efforts to develop and maintain leader character. But such efforts are not coordinated and appear to be implemented unevenly.

Improvements in moral-ethical development are needed. Recent cases of untrustworthiness include adultery and fraternization on the part of senior officers, failure to hold officers accountable for friendly fire incidents which cost lives, personal use of government aircraft, and more intrusive "zero defect" command climates which severely test principled performance at every level. Thus, if a joint culture is emerging, it is equally clear that its ethos at the joint level is largely unarticulated and has yet to be successfully inculcated. Unfortunately, neither the new instruction issued by the Chairman on PME (CJCSI 1800.1, March 1, 1996), nor *Joint Vision 2010* even broaches the question of character development for future military leaders. In addition, this ethos is undergirded only through discrete, uncoordinated, and less than effective efforts by the services to strengthen individual character and commitment to institutional values.

An overriding need exists to imbue joint PME with an ethos which is suited to the emerging culture. The moral-ethical development of leaders, their education in character, occurs much more in the field and fleet than in academic settings. But knowledge of ethics and values, which can be conveyed through joint PME, is a necessary component of this development. PME curricula are already overflowing with good joint subject matter. That is exactly the point. For the moral-ethical development of joint officers, the military risks supplanting the essential with the good. Desiring to remain a profession, those responsible for the future of joint PME should not settle for so little.

officer education is not the most effective method to deal with perceived excesses in interservice rivalry

In 1986, Congress transformed the officer corps over harsh opposition from the Pentagon. Not discounting the remarkable progress of the last decade, new difficulties have emerged for joint education. Senior military leaders should not forget the lessons of the past. The challenge now is to reshape PME—balancing the Nation's investment in its future military leaders and their character against investments in technology and forces—without relying on Congress. JFQ

NOTES

[1] The authors are indebted to the deputy chiefs of staff for personnel of all the services for providing candid comments which assisted in the preparation of this article.

[2] Here we subscribe to the definition of organizational culture advanced by Edgar H. Schein, "Culture is what a group learns over a period of time as that group solves its problems of survival in an external environment and its problems of internal integration." See "Organizational Culture," *American Psychologist,* vol. 45, no. 2 (February 1990), pp. 109, 111.

[3] Not all the reforms summarized were mandated by the Goldwater-Nichols Act. Of particular importance was the legislation passed in 1989 as a result of the efforts of a House panel chaired by Representative Ike Skelton. See U.S. Congress, House, Committee on Armed Services, *Report of the Panel on Military Education,* report. no. 4, 100th Cong., 1st sess., 1989.

[4] That such institutional change is possible, even predictable, is well documented. For example, see Deborah Avant, *Political Institutions and Military Change: Lessons from the Peripheral Wars* (Ithaca: Cornell University Press, 1994).

[5] Among many works on this subject, see Martin Van Creveld, *The Transformation of War* (New York: The Free Press, 1991), and Donald M. Snow, *The Shape of the Future*, 2d edition (New York: M.E. Sharpe Publishers, 1995).

[6] Samuel P. Huntington, "Nontraditional Roles for the Military," in *Noncombatant Roles for the U.S. Military in the Post Cold-War Era* (Washington: National Defense University Press, 1993), pp. 3–12.

[7] For early insights on such roles, see Morris Janowitz, *The Professional Soldier* (New York: The Free Press, 1960), particularly chapter 20.

[8] See Don M. Snider et al., "The Coming Defense Train-Wreck . . . and What to Do About It," *The Washington Quarterly,* vol. 19, no. 1 (Winter 1996), pp. 87–127.

[9] See International Institute of Strategic Studies, "The Problem of Combat Reluctance," in *Strategic Survey, 1995–1996* (London: Oxford University Press, 1996), pp. 48–57.

[10] For amplification of this point, see Steven H. Kenney, "Professional Military Education and the Emerging Revolution in Military Affairs," an unpublished paper presented at a symposium on the same subject convened at the National Defense University on May 22–23, 1995.

[11] See *Military Innovation in the Interwar Period*, edited by Williamson Murray and Allen R. Millett (New York: Cambridge University Press, 1996).

[12] The critical role of military leaders in peacetime innovation is well documented. See Stephen P. Rosen, *Preparing for the Next War* (Ithaca, N.Y.: Cornell University Press, 1991), particularly chapters 3 and 9.

[13] General Shalikashvili is attempting to do this but has noted a lack of progress in critical areas: ". . . despite the importance we have attached to simulations, nobody has yet developed a single, fully-tested, reliable, joint warfighting model." See "A Word from the Chairman," *Joint Force Quarterly*, no. 6 (Autumn/Winter 1994–95), p. 7.

[14] Don M. Snider, "The U.S. Military in Transition to Jointness: Surmounting Old Notions of Interservice Rivalry," *Airpower Journal*, vol. 10, no. 3 (Fall 1996).

Fires of Kuwait.

U.S. Navy (S. Gozzo)

Military Education for the New Age

B–17s over England.

U.S. Air Force Collection, National Air and Space Museum

By ERVIN J. ROKKE

During his transition from Princeton University to the White House, Woodrow Wilson is alleged to have said that academic politics are the worst kind because the stakes are so low. As any dean with curriculum revision experience will attest, Wilson had a point. Squaring curricula with student needs at the expense of faculty interests is a complex task.

The stakes clearly have changed, however, at least in the context of professional military education (PME) at the war colleges. Not only has the post-Cold War era placed new substantive and pedagogical requirements on military educators, but new demands on the relationship between PME institutions and the policy community as well. Adapting to this change is the basic challenge confronting the war colleges today.

The issue is straightforward: either the war colleges become agents for change within the individual services and joint arena or they become anachronisms. Whatever the nature of academic politics, the downside is irrelevancy at best and demise at worst. Five major factors contribute to this phenomenon.

Factors for Change

International Politics. Historians and political scientists hold that the international system changes when new answers emerge to three fundamental questions: Who are the major players?

What can they do to one another? What do they wish to do to one another? The unexpected end of the Cold War was only the latest watershed in the world order. One classic example is the French Revolution which spawned a new player (democratic France), a new capability (a citizen army), and new intentions (liberty, equality, and fraternity). Similar transitions occurred with the Congress of Vienna (1815), German unification (1870), Treaty of Versailles (1919), and agreements following World War II.

From the perspective of war college curricula, it is useful to examine the ongoing post-Cold War transition against the backdrop of past changes. In each instance the results were not readily apparent. The answers to questions concerning players, capabilities, and intentions are no more likely to surface quickly or clearly today than in previous realignments of the international system. Assessments made in the democratic atmosphere of Paris circa 1789 did not foresee an autocratic Napoleon on the horizon. Similarly, most internationalist projections made at Versailles following World War I failed to predict a global depression or a resurgent Germany.

perhaps no single factor has as much potential as the information explosion

The first requirement then for the curricula at war colleges is to ensure that students do not presume to know who their future opponents or coalition partners will be. This appreciation for uncertainty is the beginning of wisdom in the post-Cold War era. But underscoring uncertainty is not the same thing as saying that everything is up for grabs. On the contrary, it means that the war colleges must delve into what is known but is frequently neglected in the defense establishment. For example, students must understand more than their predecessors about economics, technologies, and diverse cultures to make sound judgments. This perspective brings into question several major tenets of defense policy which were prevalent in a bipolar world. Although it offers few clear-cut policy prescriptions, it is essential to appreciating the security implications of a world order in flux.

Technology. Advances in technology are hardly new phenomena. Stirrups, gunpowder, the steam engine, radio, stealth, and other innovations dramatically changed the nature of warfare. Curricula are replete with cases of how such advances were treated by institutions and individuals wedded to more traditional approaches.[1] Recently, however, breakthroughs related to warfare have occurred with greater frequency, more substantial impact on quality versus quantity tradeoffs, and increased organizational implications.

A former director of the Defense Intelligence Agency, Lieutenant General James Clapper, has raised an excellent case of the accelerating impact of technology on quality-quantity tradeoffs.[2] During World War II some 9,000 bombs dropped by more than 1,500 B–17 bomber sorties were required to destroy a 6,000 square foot target. In Vietnam the destruction of a similar target took only 176 bombs delivered by 88 F–4 fighter sorties. During the Gulf War, one bomb carried by an F–117 fighter-bomber did the job. This is not to imply that a single 2,000 pound bomb can today destroy every 6,000 square foot target. Advances in guidance system technology, however, have made a qualitative improvement in weapon effectiveness. Technological advances by ground and naval forces also resulted in impressive warfighting efficiencies during Desert Storm.

Equally important for PME are the organizational, structural, and budgetary implications of accelerated technological breakthroughs. The price of improved technology is high, particularly if applied to such systems as the stealthy F–117 aircraft. Indeed, given the tradeoff between a new item of equipment representing a breakthrough in sophistication as opposed to just a better, simpler item, some defense experts argue for the latter.[3] Whatever the ambiguity of quality versus quantity tradeoffs, however, the organizational impact of increasingly expensive high tech items is clear. As the cost and operational complexity of systems increase substantially, the organizational response is centralization. In the case of the evolution from photographic reconnaissance aircraft to satellites the focal point of operations and control moves from the battlefield to Washington.

Information. Perhaps no single factor has as much potential as the information explosion for changing the way in which military organizations function, both during peace and in war. The widespread adoption of information technologies in the latter part of this century has set the stage for a social transformation of historic magnitude by making unprecedented amounts of information instantaneously available in easy-to-use forms at ever-diminishing cost. The emerging information highway, which extends from earth to geosynchronous orbit, will certainly alter society, to say nothing of conflict. Worldwide 24-hour connectivity and sensors and hardware needed to support information processing are already in place. So are stand-off weapons that can be

Lieutenant General Ervin J. Rokke, USAF, is president of the National Defense University and formerly served as assistant chief of staff for intelligence at Headquarters, U.S. Air Force.

launched from almost anywhere and strike targets with accuracy measured in fractions of yards.

To date the best thinking on innovative applications for information age technologies has been done by the staff of the Office of Net Assessment under Andrew Marshall at the Pentagon. They have recast functional areas associated with traditional service expertise into precision strike, dominating maneuver, space warfare, and information warfare. Moreover, they suggest that the potential for a revolution in military affairs (RMA) exists in a zone where these new warfare areas intersect and offer a new construct that demonstrates the military potential afforded by information. The Vice Chairman, Admiral William Owens, with similar logic, has advanced a vision of a 200 square nautical mile battlefield box about which virtually everything is known on a near real-time basis and within which all targets can be hit using standoff weapons.[4]

U.S. Army (Larry Lane)

"Digital" soldier.

Not surprisingly, debates about whether RMA notions are fact or fiction provide grist for the mill in many PME seminars. But information age issues go far beyond procedures for waging war to the heart of military organization. Cheap microchips and breakthroughs in communications have made huge amounts of information available and created pressure for decentralization and flat organizational structures. Bluntly stated, vertical organizational structures long associated with the military, along with the centralization resulting in part from high tech and costly equipment, are not optimal for the information age. When tank, ship, and aircraft operators can directly receive much of the information they need to fight, at least some higher headquarters will become extraneous.

Jointness/Coalition Warfare. Consistent with the Goldwater-Nichols Act, the increasingly prominent combatant CINCs have responsibility for command and control in warfare. To support them, the services have made major improvements in collaboration and interoperability. Jointness is in. Outstanding professionals are now assigned to positions on joint staffs, and a succession of JTF exercises and deployments has proven that the Armed Forces are capable of functioning within multi-service command structures. Even service monopolies on developing requirements have been redressed by the Joint Requirements Oversight Council (JROC) overseen by the Vice Chairman.

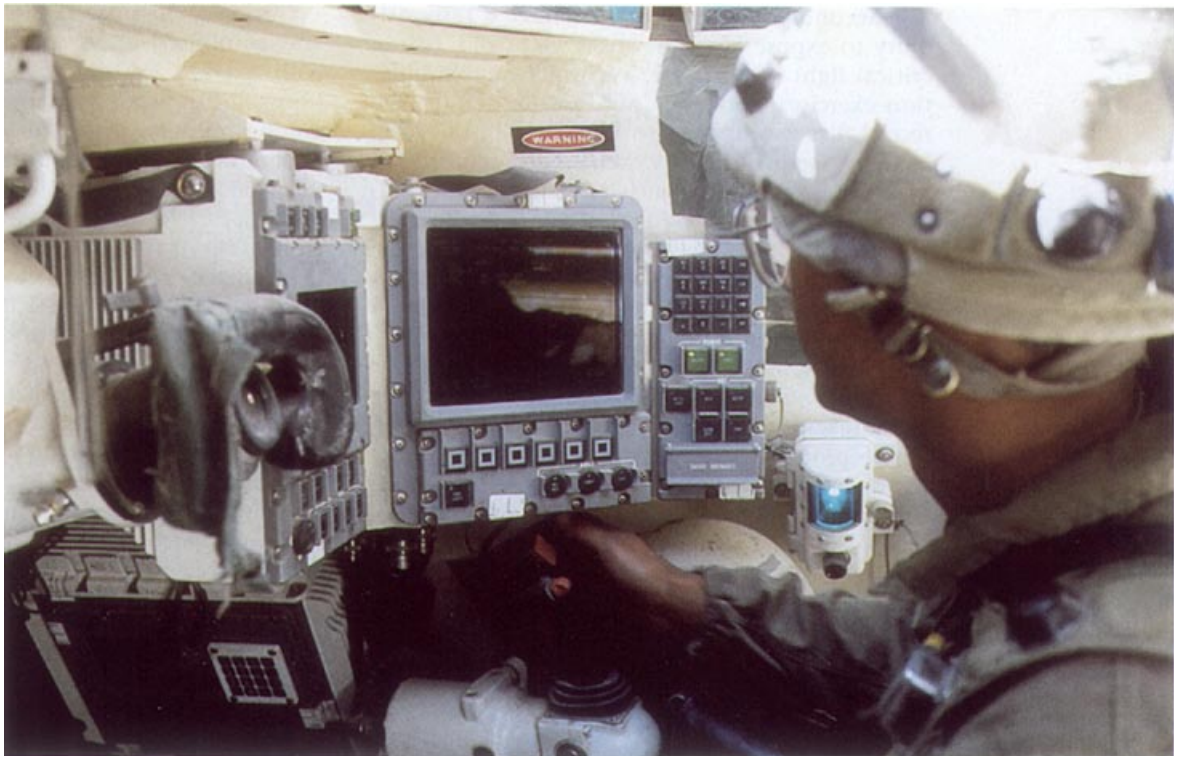
As the services become more familiar with joint responsibilities and work more effectively together, we also are finding that the likelihood of the United States fighting alone is becoming remote. Experiences such as the Gulf War, former Yugoslavia, and other recent crises suggest that alliances and well-greased multinational command chains are insufficient if not outmoded. Ad hoc alliances and coalitions are the norm, and the United Nations is increasingly involved in humanitarian and peace operations.

Coordinating strategy and tactics to include rules of engagement as well as the distribution of intelligence to coalition partners with both varying capacities for information and differing levels of security access are tasks that war college graduates face. The problem becomes more complex as tensions arise between the centralizing tendencies of jointness and the decentralizing, multiple chain of command biases of coalition warfare.

Ecology. Perhaps less known but significant in their impact on security are environmental phenomena. While this area has received little attention in PME, it is drawing increasing emphasis worldwide. It embraces climate change, ozone depletion, deforestation, biodiversity loss, and air and water pollution. Recent examples include the 1989 conflict between Senegal and Mauritania which was sparked by a scarcity of water and arable land, and the mass migration from Rwanda which became a crisis of epic proportions because of the lack of potable water. In short, ecological developments could well affect the circumstances under which the Armed Forces are used as well as how they are used. Clearly this new challenge is relevant to PME—although it has gone largely unaddressed.

And so it is that various factors, from international politics and ecology through technology and information, are moving doctrine, organization, and operations in new and often conflicting directions. As General Wayne Downing, Commander in Chief of U.S. Special Operations Command, told students attending the School of Information Warfare and Strategy, "In the information age, the very nature of war is changing."[5]

Inter-vehicle information system.



U.S. Army (Larry Lane)

Imperatives for PME

The central task of war colleges is to prepare students to succeed across a broad spectrum of national security challenges. The impact of these institutions is in large part a function of how well their graduates perform. We are in the business of equipping leaders to deal with the security environment of the 21st century. The unpredictable nature of the ongoing process of change makes this more akin to a floating craps game than an exact science. Nevertheless, it is a game in which we all must play. As the Chairman, General John Shalikashvili, observed, "The unexpected has become the routine; we need people who are comfortable in an uncertain world."[6] In this game, the role of war colleges is to make the odds better for graduates. And those odds can be shortened by doing everything possible to convey an understanding of the emerging security environment as well as teaching students to recognize and deal with the unexpected. This is the PME challenge.

war colleges must equip leaders to function in a world where rapid change is the norm

Managing change is what national security is all about. War colleges must equip leaders to assume this critical responsibility. We must give graduates the tools to function comfortably in a world where rapid change is the norm. To do so, however, professional military education needs to adapt in three ways. First, we must strengthen the capability to affect the full spectrum of national security policies by embracing added roles for PME. Second, we must revise curricula and supplement the substance of what we teach. Finally, we must update pedagogical concepts, approaches, and technologies.

Like most institutions of higher learning, war colleges can become ivory towers divorced from the world which they serve. If they are to help align military culture with the technological, environmental, and geopolitical revolutions, they must be fully in tune with national security processes which stimulate and implement change. This goes beyond policy formulation and includes technology insertion, doctrine development, planning and budgeting, and training.

How can PME institutions do this? First, they should be "present at creation" to ensure an environment that encourages new thought and rewards rather than punishes innovation. Similarly, they must follow organizational processes for change. War gaming, policy-relevant research, and faculty participation in ad hoc commissions are classic examples. Each war college has a research institute to connect its parent institution with the activities of the national security community.

Secondly, PME institutions have a responsibility to expose ideas, new as well as old, to the critical light of academe. Wargames and simulation exercises work well. So do informal, off the record discussions between students and visiting lecturers from the policy arena. Each senior PME institution enjoys special relationships with individuals sympathetic to the military and who literally try out new ideas on faculty and students. More of these exchanges are needed with policymakers and leaders who are not instinctively sympathetic to military culture.

Finally, PME institutions have a duty to be harbingers of change. Classes and seminars are common ways for disseminating innovative ideas. So are professional journals. Less developed, but with greater potential, are options associated with the information highway. Without a home page and a routine means for distributing the best of faculty and student research, a war college is simply not doing its job in the information age. In brief, PME can and must play a central role as an agent in altering that greatest barrier to meaningful change—our traditional culture.

Adapting Curricula

In the classroom, as in headquarters or war zones, the basis for innovation lies in critical thinking about capabilities, concepts, and organizations relevant to current and future needs. As in the past, military innovators in the information age must develop an appreciation for what exists as well as analytic skills for critiquing the status quo. It is not a choice between notions of modern warfare and more abstract theories of coercion. Unfortunately, for already tight curricula and busy students, it is a combination of both.

Indeed, because of the complexity of joint and combined operations, curricula must deal with the doctrine and capabilities of multiple nations and services. Moreover, blurred boundaries among military, diplomatic, economic, and psychological tools require unprecedented sensitivity for what policy types call the interagency process. In sum, developing PME curricula—like our security environment itself—is of necessity an exercise in risk limitation. There simply is not the time to cover all contingencies. The most one can do is prepare for dealing with uncertainty.

The classic approach to this dilemma is a balance among academic disciplines, the interests and backgrounds of students, and the demands of theory and practice. Like a classic liberal education, war college curricula must cover a range of academic disciplines that include basic and engineering sciences as well as humanities and the social sciences.

What then is different about curricular requirements today? For a start, the balance of PME has shifted with the advent of the revolution in information technology. While military strategists in past revolutions, such as that brought on by nuclear weapons, tended to be civilian thinkers with humanities and social science backgrounds, the current revolutionary force puts a higher premium on basic and engineering sciences. Historical perspective and an appreciation of bureaucratic politics remain vital, but an adequate intellectual framework in the information age requires some understanding of the ones and zeroes being passed around in such incredible quantities. In short, the center of mass at the war colleges must move toward more technical academic disciplines.

Educational and Research Initiatives

U.S. national security will be increasingly affected by the ability to adapt doctrine, organizational concepts, and operations to fully exploit information technologies. Toward this end, the National Defense University (NDU) has established a teaching, research, and outreach activity to focus on the development of a vision for national security in the information age. The Directorate of Advanced Concepts, Technologies, and Information Strategies (ACTIS), an element of the Institute for National Strategic Studies, merges efforts of the School of Information Warfare and Strategy and the former Center for Advanced Command Concepts and Technology. Working under guidance issued by the Director of the Joint Staff and the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence, ACTIS serves as a center of excellence for information warfare within DOD. This enhances the educational as well as the research mission of NDU by contributing to knowledge in a rapidly evolving field, offering courses on information warfare, and disseminating material on information warfare.

NDU is currently developing a three-tier educational program for the School of Information Warfare and Strategy. On the first tier information concepts will be introduced and integrated into the core curricula of the National War College and the Industrial College of the Armed Forces. On the second the school will offer a broad range of information warfare electives to all students at both colleges. Finally, on a third tier, students will be able to select an intense elective program in information studies to become the information specialists of the future.

ACTIS is the DOD executive agent for research on command and control and information warfare and also designs and manages an extensive research and analysis program. In addition, it provides outreach activities, including short programs of instruction, workshops, symposia, and on-line services, and will disseminate information warfare concepts, research, and course material. JFQ

How We Teach

War colleges justifiably take pride in teaching techniques, which traditionally have included seminar-style classroom interaction as well as lectures by faculty and visitors, many of whom are involved in the policy arena. Excellent student to teacher ratios, as well as diverse student bodies, facilitate the high quality of seminar discussions. Though student diversity across the services and defense-related civilian career fields is most balanced at the National Defense University, service war colleges also ensure student representation from the other services and civilian agencies.

Regardless of quality, however, it is increasingly probable that teaching techniques need to be supplemented to cover a rapidly changing security environment and the increased information age sophistication of incoming students. The notion that a ten-month experience at a war college is sufficient for students who may serve for a further ten years has always been questionable. Most certainly the accelerating pace of change today makes it important that we begin to provide follow-on educational opportunities for PME graduates.

a major challenge for war colleges lies in developing follow-on education

Technology for distance learning is available and the cost of personal computers is falling. Military personnel take lap-top computers on temporary duty to communicate with offices, homes, and educational institutions offering degree programs over the information highway. Beginning last year, students at several PME institutions were issued lap-tops. The Air Force Command and Staff College, in particular, has made substantial progress in offering virtual seminars to students on a worldwide basis. Both the Army and Air Force have begun providing lap-tops with modems to general officers. The Army has also funded a leadership development program at the Industrial College of the Armed Forces which will be implemented using lap-top computers.

A major challenge for war colleges lies in developing the substance of follow-on education programs for transmission via the information highway. Simply transmitting research products is an initial but insufficient step. Faculty members whose dialogue with students has been limited to the classroom must develop and conduct virtual seminars using distance learning. In fact, since faculty resources are unlikely to expand, new course development might involve curtailing some existing courses. Before the next century, PME graduates need the option of communicating with war colleges on national security issues.

To conclude, there is a current revolution in PME that parallels the RMA. In both cases, core functions and procedures are undergoing fundamental changes. In both cases, we are seeing disparate rates of progress among the constituent parts. And in both cases, we are facing difficult resource tradeoffs between traditional approaches on the one hand and information age alternatives on the other.

PME institutions must assume the role played by first class research universities. We have a duty to mobilize our institutions to expand knowledge through research, educate practitioners, and serve as catalysts for change through outreach. The war colleges must provide the intellectual capital for changing the existing paradigm.

The stakes are high in the revolutions in military affairs and professional military education. Significant obstacles and inertia must be overcome. The RMA has the potential to alter priorities among service capabilities. Similarly, the revolution in PME—challenging curricula and teaching methods—has the potential to transform war colleges into innovative centers that spawn and foster new concepts of warfare. In the final analysis, both revolutions demand changes in culture. Since PME shapes and promotes service and joint cultures, it would be difficult if not impossible for the RMA to succeed without a corresponding revolution in war college curricula. This places a major burden on those of us involved in PME and requires that we move ahead with the revolution. JFQ

NOTES

[1] A classic example is found in Edward L. Katzenbach, Jr., "Tradition and Technological Change," in *American Defense Policy*, 5th edition, John F. Reichart and Steven R. Sturm, editors (Baltimore: The Johns Hopkins University Press, 1982), pp. 638–51; also see Stephen P. Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, N.Y.: Cornell University Press, 1991).

[2] James R. Clapper, presentation at the National War College, February 9, 1995.

[3] See Jack N. Merritt and Pierre M. Sprey, "Negative Marginal Returns in Weapons Acquisition," in *American Defense,* 3rd edition, Richard G. Head and Ervin J. Rokke, editors (Baltimore: The Johns Hopkins University Press, 1973).

[4] William A. Owens, speech to the Retired Officers Association, Des Moines, Iowa, July 1, 1995.

[5] Wayne A. Downing, presentation at the School of Information Warfare and Strategy, National Defense University, August 16, 1995.

[6] John M. Shalikashvili, presentation at the National Defense University, August 18, 1995.

Keeping the Strategic Flame

By CARL H. BUILDER

U.S. Air Force Historical Center

B–17s on daylight raid over Germany.

Strategic thinking by the American military appears to have gone into hiding. Planning on the tactical and operational levels flourishes, but the strategic level is largely discussed in historical terms rather than as current art. Three decades ago, strategic thought burnt bright in the sanctuary of the national security temple. And for three decades prior to that—back to the 1930s—strategic theorizing dominated military debates in this country.

What happened? We cannot blame the demise of the Soviet Union since the strategic flame began to dim during the 1960s, a quarter century before most people believe the Cold War ended. It cannot be a decline in the defense budget, for we spend about the same amount in real terms today as at the height of strategic thinking in 1955.[1] Some may blame the Vietnam War when the military every bit as much as our civilian leadership seemed to lose its strategic compass. But the cause may lie deeper in military institutions. And even if it should be found, that may not motivate a revival of strategic thinking, for few lament its absence today.

Carl H. Builder is a senior staff member with the RAND Corporation and author of *The Icarus Syndrome*, an analysis of airpower theory in the evolution of the Air Force.

I would like to pursue three sets of questions about this paucity of strategic thinking:

- What is strategic thinking? How can it be distinguished from other kinds of military thought?
- What happened to strategic thinking? What caused its flame to wax and now wane?
- Why should we mourn the absence of strategic thinking today? What will it take to rekindle the flame?

I will argue that the strategic flame must be rekindled and kept alive. It has gone out twice before in this century to the Nation's detriment.

The Strategic Idea

The familiar terms *strategic* and *tactical*—which act as bookends on either side of the term *operational*—have accumulated lots of baggage in this century, and some of it must be jettisoned at the outset. The best way to do that is to start over. General Glenn Kent, the legendary Air Force analyst, sometimes admonished those who were about to brief him that they could define terms in any way they wished, but he would hold them strictly to their definitions. To avoid confusion, he urged briefers to use simple dictionary definitions. For the terms *strategic* and *tactical*, the ordinary dictionary definitions are close enough and strip away some of the baggage that encumbers them in military usage. But to sharpen the differences, a distinction should be made between strategic and tactical as separate kinds of endeavors (see figure 1). Note that these differences between strategic and tactical do not refer to types of weapons (nuclear or conventional), their range (intercontinental or theater), or the ways in which military power is applied (force, logistical, or surveillance).

***Joint Vision 2010* is a current illustration of thinking tactically**

Figure 1. Redefining Two Familiar Terms

Term	Strategic	Tactical
Objective	Going to the heart of the matter	Dealing with the matter at hand
	Going for the jugular	Playing the hand dealt
Focus on	Ends	Means
Nature	Transformatory	Engaging
Style	Game-changing	Game-playing
In the game of chess	Check and mate moves	Opening and castling moves
In Vietnam	Why we went there: Stopping the fall of southeast Asian dominoes	What we ended up doing: Trying to defeat an opposing military force

These distinctions beg for some comparison with the term *operational*, which lies between strategic and tactical. By contrast with the other two, the operational enterprise has as its objective *providing the means*—getting the right things in the right amount to the right place at the right time. This operational quality of the American military has long been the envy of the world. Repeatedly during this century it has moved large land, naval, and air forces, set them up, and made them fully functional halfway around the globe. It required more than logistics or support. It meant knowing which units to send where and when in order to create complex military forces that could fight as well as defend and support themselves—precisely as they were organized, trained, and equipped to do—from the first to the last forces sent.

If the operational thinking of our military is secure and without peer, and if tactical thinking has come to the fore, strategic thought has been all but abandoned. The difficulty lies in seeing the strategic side of national security increasingly as the province of politicians and diplomats while the operational and tactical sides belong to the military, free from civilian meddling (for some evidence of this development, consider the examples outlined in figure 2).

The current demand by the military for well-defined objectives is eloquent evidence of how far our thinking has drifted toward the tactical domain. The insistence on operationally planning based on enemy capabilities, while tactically prudent, is the antithesis of strategic thinking, which should concentrate on enemy vulnerabilities. Although defeating enemy forces may sometimes be necessary to achieve our objectives, it is not always the Nation's or the military's best option.

Joint Vision 2010 is a current illustration of thinking tactically. It is largely about engaging an enemy with joint forces in the future—without evident purpose beyond fighting and winning.[2] It could instead have been about the different ways military power, through joint capabilities, might be brought to bear on the future spectrum of national interests. The military planning posture that came out of the Bottom-Up Review at the start of the first Clinton administration is a contemporary example of operational thinking. It explained (or argued) what kinds of forces in what amounts are needed where and when for two nearly simultaneous major regional contingencies. It is difficult to find current instances of strategic thinking from within the American military.[3]

The strategic flame is a metaphor for the grand idea that military power can sometimes be brought to bear most effectively and efficiently when it is applied directly toward a nation's highest purposes without first defeating defending

Figure 2. Examples of Strategic and Tactical Thinking

Strategic	Tactical
What are our national interests and objectives?	What is the military objective?
What are an enemy's *vulnerabilities?*	What are an enemy's *military capabilities?*
What will it take to achieve national objectives?	What will it take to defeat an enemy's military?
How can we most quickly go to the heart of the issue?	How should we best engage an enemy's military?

enemy forces. It is an enduring idea latent in the age-old precept of seizing the enemy capital, but one which was often frustrated by the interposition of defending forces. So long as military forces were confined to the surface of the earth and limited in mobility, as was the case prior to the 20th century, strategic thinking was mostly positional—the occupation of capitals, straits, ports, etc. Seizing or occupying such critical points was a strategic objective, but access could be denied or delayed by defending enemy forces that typically had to be defeated before any objectives were achieved. Thus, winning a war became the *sine qua non* for pursuing strategic aims. Little wonder that combat was seen as a noble contest among professional warriors over a prize, which was a disarmed or vulnerable opponent finally opened to the strategic designs of the winning state, which is pure Clausewitz.

The technological achievement of flight through the air and then in space provided the first plausible opportunity to test the existing barriers to strategic objectives. Strategic thinking became militarily actionable: national objectives could be achieved directly, without first defeating enemy forces. Airmen were the earliest to see, elaborate, and promote this idea. What made airplanes distinctive from surface forces was that access to strategic objectives could be sudden—a matter of hours or minutes with little or no warning—from any direction and to any place. As with surface forces, the interposition of defenses was still conceivable but not as certain. The agility and rapidly increasing speed of aircraft made the kinematics of defenses appear much less advantageous. The advent of ballistic missiles and space technologies in mid-century made defenses against strategic actions even more remote.

The strategic thinking made actionable by planes and then missiles was controversial from the outset. It first appealed mostly to aviation-minded people such as Smuts, Douhet, Trenchard, and Mitchell; but aviators such as Chennault and Moffett were skeptical of expansive claims by air strategists. World War II demonstrated these arguments in the European and Pacific theaters.

The Idea in Practice

Over Europe in the 1940s, British and American airmen played out strategic bombardment theories with results that ranged from failure at worst to ambiguity at best. "Bomber" Harris and "Hap" Arnold structured forces and mounted bombing campaigns around their respective ideas that the aircraft would always get through and the industrial base of the enemy war machine could be destroyed by precision daylight bombardment from self-defended bomber formations. Those ideas proved disastrous to aviators who tested them over Germany. Their bomber forces were too small to overwhelm enemy defenses; and they found themselves in an age-old battle with the defenders, precisely the clash the strategic theorists had promised they could avoid.

The British took up bombing at night to evade the worst of the defenses; and the Americans found themselves in a fighter-plane battle for control of daylight skies over Germany as Chennault had warned. It had become a war of attrition even in the air. By the time the United States built up its fighter and bomber forces enough to overwhelm German air defenses, the forces were diverted to support tactical objectives for the impending invasion of Europe.[4] Thus the theory of strategic bombardment remained either incompletely tested (to airmen) or discredited (to the critics).

In the Pacific, a strategic campaign was carried out on land, under the sea, and in the air. Because of the "Europe first" policy adopted by Roosevelt and Churchill, the Pacific war had to be fought with an economy of force, not by attrition. On the surface, MacArthur and Nimitz pursued island-hopping campaigns to seize only bases needed to close on the strategic objective of Japan. They did not attempt to defeat the enemy en masse or to push back its entire perimeter. Under the sea, American submarines closed the waters around Japan to shipping[5] instead of scouring open seas for enemy naval forces.[6] In the air, both MacArthur and Nimitz used their air forces tactically to support strategic island-hopping campaigns that led to air bases within practical striking range of Japan. It was Curtis LeMay who then used such bases to strategically launch aircraft over Japan.

DOD

Loading equipment for Desert Shield.

After learning that the theory behind the development of the B–29 wasn't workable, LeMay completely subverted available means to pursue strategic ends. Since the combination of daylight bombing from self-defended formations at high altitude using high-explosive bombs could not gain the desired effect, he stripped the defensive armament from B–29s and flew them at night without formations and at medium altitude to maximize their loads of incendiaries. Whatever the legality or morality of such bombing, LeMay was clearly on the way to burning down every major Japanese city when the atom bomb punctuated his campaign with an exclamation point.

the strategic idea appeared finally to have come of age in the 1950s

The Strategic Bombing Survey,[7] conducted following World War II to validate or refute strategic bombardment theories, did not resolve the dispute, although the atom bomb now seemed to make the argument academic. It was obvious that even a few bombers armed with these atomic weapons could be enormously destructive; and defenses able to deny all the planes access to their targets seemed all but impossible. The advent of the ballistic missile, with access times measured in minutes rather than hours, simply compounded the problem of defense against strategic actions. The strategic idea appeared finally to have come of age in the 1950s.

But the strategic stalemate of the Cold War was bypassed in a series of conflicts in which strategic objectives were tempered by larger political considerations than fighting or winning wars. In Korea, Vietnam, and elsewhere pursuit of strategic objectives, while technically and militarily feasible, was deemed too risky in its potential impact on other foes and domestic support. Even as strategic thinking defined the broader and more vital framework of the Cold War, it seemed useless for militaries mired in conflicts where the strategic options were arrogated to their civilian leaders.

In retrospect, however, strategic thinking did reappear periodically, sometimes in stunning forms—and not just in framing and sustaining the nuclear standoff at the nexus of the Cold War. While it may have been conceived as a tactical alternative at the time, the Berlin airlift of 1948 was a strategic masterpiece. It not only fulfilled its tactical objective of feeding and fueling the populace of Berlin (that is, dealing with the matter at hand); it *transformed* the game on the strategic level. The Soviets blockaded land routes to Berlin, believing that the West would have to choose between initiating hostilities (perhaps precipitating World War III) or abandoning Berlin. Supplying Berlin by air was inconceivable to the Soviets based on their own limited experience with airlift and the failed German effort at Stalingrad. What no one on either side seemed to recognize then or now is that an airlift would turn the tables and oblige the Soviets to initiate hostilities. That was check. When the sufficiency and sustainability of the airlift became apparent, it was checkmate. Thereafter, if the blockade was to be continued the West could only gain international admiration at the expense of the Soviets.

The Cold War yielded another transformatory strategic action in the Cuban missile crisis. On the strategic (game defining) level, the struggle for world opinion focused on who was telling the truth about missiles in Cuba. The United States asserted their presence and the Soviet Union denied it. Both sides had predisposed supporters in the absence of contrary evidence. The aerial reconnaissance of Cuba, clearly revealing a build-up of Soviet missiles and facilities, transformed the debate. In a dramatic moment, Adlai Stevenson, the U.S. representative to the United Nations, posted the reconnaissance photographs for all the world to see and declared that he was prepared to wait until hell froze over for the Soviet explanation of the evidence. The aerial reconnaissance and public release of the photos (unprecedented at the time) was a strategic action—the pursuit of the Nation's highest purposes without first defeating enemy forces.

Note that both the Berlin airlift and the Cuban reconnaissance utterly transformed the

East-West games being played at the time; yet strategic objectives were accomplished not by force but with military capabilities that normally support fighting forces. These cases are stunning proof that the strategic use of military power does not always take the form of military force. Indeed, cases of strategic action during the Cold War which involved the use of force are much more ambiguous in their effectiveness. They include coercive and punitive raids on Hanoi and Libya—the first to bring the North Vietnamese to the negotiating table and the second to punish Kadafi for presumed connections with terrorism. The pertinence and impact of both actions are still argued today.

When the Flame Is Low

With the end of the Cold War and the political constraints imposed by the risks of nuclear confrontation, one might have expected a renaissance in strategic thinking in the American military. It hasn't happened. Both the Persian Gulf War and Bosnian conflict have been approached mostly in operational and tactical terms. In the Gulf, only the first rapid deployments into the theater as part of Desert Shield prior to October 1990 were unambiguously strategic, at least as defined here. Protecting oil fields south of Kuwait was our first and highest interest; and that was accomplished by force deployments, not engaging and defeating enemy forces. Subsequent interests—ejecting the Iraqis from Kuwait and ending the threat to the region—were largely approached operationally and tactically: Iraq's air defenses were temporarily neutralized and its air force shattered. Coalition ground forces were built up until they were capable of frontal assaults on Iraqi armies that had been weakened by aerial attacks. Even the Scud missile threat was dealt with tactically—offensively in Scud hunts and defensively by Patriot missiles—to keep Israel out and the coalition together, both of which were means, not ends.

military power can sometimes be brought to bear when it is applied without first defeating defending enemy forces

Thus the Gulf War was not dominated by strategic actions; it was mostly a demonstration of operational and tactical virtuosity—precisely the sort of opportunity our military has increasingly sought from civilian leaders since Vietnam. Moreover, subsequent actions in the Gulf have been mostly tactical: punitive strikes against an intelligence facility and air defense installations. Two air embargoes have not stopped Iraq from either using helicopters or abusing its own minorities.[8]

The strategic ends to which our military power might be applied over Iraq today are not so clear. Hence we default to a tactical use of force: beating up the opposition. The strategic problem is the Iraqi leadership, not its people nor its military; and separating these elements for the strategic application of military power is not easy. Airpower is thus applied to tactical ends, to taking down air defenses in preparation for what—other tactical applications of airpower? This is evidence that the strategic flame has dimmed.

Curiously, the American response to the Bosnian conflict may have demonstrated more by way of strategic thinking. Dropping supplies was the direct pursuit of one of our highest interests at the time—heading off winter starvation within the Muslim enclaves—without seeking to engage opposing forces. While the air embargo over Bosnia appears to have been no more effective than efforts over Iraq, Operation Deliberate Force may have been a direct factor in ending the fighting and bringing the Serbs to the bargaining table. Moreover, it appears that the strikes in Deliberate Force were not directed so much at military forces as at intimidating their leaders. We may have to wait for history to clarify the strategic thinking involved in the run-up to the Dayton accords.

Such examples and the definition of the strategic idea might suggest deliberate exclusion of fighting or surface forces. Not so. Throughout the Cold War, fighting forces—whether land, sea, or air, nuclear or conventional, whose presence and readiness served to deter conflict—were key to the grand idea that military power can sometimes be brought to bear most effectively and efficiently when it is applied directly to the highest national interests without first defeating defending enemy forces. That grand idea does not exclude applying military power directly against opposing forces if their defeat or destruction advances national interests. There are circumstances when that could conceivably be an end in itself, without further action, such as eliminating enemy capabilities for employing weapons of mass destruction. But the cases are few. Eliminating the Iraqi Republican Guards as a power base for Saddam Hussein might have been strategic in intent, but their power rested in their loyalty to him more than their arms. Thus their defeat on the battlefield may not have been a sufficient means to that end.

Israel seems to have appreciated the strategic use of military means for its highest interests in the 1976 Entebbe raid and the 1981 strike on the nuclear reactor near Baghdad. These probes were not about defeating enemy forces or winning a war; both were direct applications of military force toward national ends—recovering hostages and thwarting hostile nuclear developments.

Nevertheless, the strategic role of fighting forces began to shift when nuclear weapons and global access became feasible in the mid-20th century. This time, the seminal strategic thinking seemed to spring from civilians rather than the military. Bernard Brodie was thinking strategically fifty years ago when he observed what nuclear weapons implied: "Thus far the chief purpose of our military establishment has been to win wars. From now on its chief purpose must be to avert them. It can have almost no other useful purpose."[9] At about that time, George Kennan suggested that our interests would best be served by "a long-term, patient but firm and vigilant containment of Russian expansive tendencies [until] the break-up or the gradual mellowing of Soviet power."[10] These ideas on deterrence and containment remained pivotal to our thinking about national security throughout the forty-year Cold War. Of course they would be modified and elaborated over time and in light of new developments, both political and technical. Containment was embellished with massive retaliation, flexible response, and détente. Deterrence was defined by criteria of assured destruction, extended to cover allies, and eventually mocked as mad. Concepts for massive civil defense and missile defense programs disturbed, but could not displace, deterrence as the strategic core of national security. Vestiges of that core are still found in operational thinking, in explaining the purpose of military forces—to deter enemies and, if that fails, to fight and win.

With the end of the Cold War and recession of an immediate nuclear threat to our survival, tactical thinkers may have anticipated that the military could get back to its real job—winning wars. Alas, as Martin van Creveld suggests, the relevance of traditional state-on-state warfare is declining in a world where proliferating nuclear technology is an inevitable consequence of global trade:

Slowly, unevenly but inexorably, nuclear proliferation is causing interstate war and the kind of armed forces by which it is waged to disappear. The future belongs to wars fought by, and against, organizations that are not states. . . . Unless some yet to be designed system enables states to reliably defend themselves against nuclear weapons . . . the writing for large-scale, interstate war, as well as the armed forces by which it is waged, is on the wall.[11]

When the Flame Dies

The strategic flame can go out. It flickered twice in the past—both before and after World War II. It died with Billy Mitchell's court martial and the exile of upstart Army aviators to dusty posts in Kansas or fetid jungle camps in Panama or the Philippines to atone for their radical ideas. It briefly went out again when America demobilized after World War II and before the onset of the Cold War. On both occasions we had to scramble to rekindle it and rebuild new institutions from scratch. And, to our peril, we very nearly missed rebuilding in time.

Although our experience in rekindling the strategic flame is limited, a pattern is evident. It starts with a seminal strategic idea—how military power might be more effectively and efficiently applied to pursuing national interests without necessarily engaging defending enemy forces. That idea is then translated into strategic doctrine—rules or principles about the best way military power can be forged to pursue strategic objectives. The doctrine then becomes the objective specifications for developing military capabilities and drives the acquisition of new systems. This pattern could be recognized when the strategic flame was relighted at the Air Corps Tactical School in the 1930s and in the Strategic Air Command (SAC) in the 1950s.

As war clouds gathered over Europe in the 1930s, airmen at the Tactical School at Maxwell Field began to entertain the idea of economic targeting. It was a strategic idea in the sense defined here. It presumed that an enemy might be defeated by destroying critical economic activities—factories, industries, resources—supporting its war machine. But these airmen did not know how to execute that idea at first. They had to study national economies to identify economic targets; and they had to determine how to damage or destroy such targets. Their answer was precision aerial bombardment. But they went further doctrinally. To be precise they needed a better bombsight; and to see targets they had to bomb by daylight. To gain access to targets without first defeating defending enemy forces, they would need long-range bombers that could survive by flying at high altitude in self-defended formations. That doctrine drove development of the Norden bombsight and the acquisition of the B–17 Flying Fortress. Establishment of the semi-independent Army Air Forces followed as these capabilities emerged.

Strategic thinking came first, before the capabilities were in hand. Doctrine, development, acquisition, and institution-building followed logically. It can be argued that the strategic thinking at the Air Corps Tactical School was not sound, that the theory of economic targeting was beyond the means chosen by at least another decade—it would take a breakthrough in the destructiveness of weapons. But the validity of their theory is not the test for the existence of strategic thinking. No

Berlin airlift, 1948.

U.S. Air Force

Norden bombsight.

Northrop Grumman

one would suggest abandoning operational or tactical thinking if it sometimes proved wrong or reached beyond available technology. Airmen in that day were thinking strategically and thus laid the foundations for American security policies for the next half century.

The very same pattern was repeated in the emergence of SAC some two decades later. As the outlines of the Cold War began to take shape in the late 1940s, America's nuclear posture was in disarray: Neither the weaponry nor means of delivery had been maintained beyond research and experimentation. This time, the seminal strategic thinking came from civilians like George Kennan and Bernard Brodie in the concepts of containment and deterrence. The military problem was how to implement the concept of deterrence. The solution was to make the threat of nuclear retaliation to an attack on the United States so evident, quick, certain, and massive that any rational enemy would be dissuaded from making such a mistake. But again it was strategic doctrine that drove developments, acquisition, and institutions. Central to SAC was the doctrine of a single integrated operational plan, the scheme to constantly maintain trained, tested, ready nuclear forces to execute a massive, coordinated nuclear attack upon the Soviet Union. That plan drove the development of a series of bombers and ballistic missiles, tested their crews, and argued for requisite force levels. The institution that evolved became the military centerpiece of the Cold War; and its effects are still evident in military planning and culture today. SAC wasn't conceived to defeat an enemy air force; it was designed to fulfill the Nation's highest security objective directly—to deter a nuclear attack by the visible threat of unacceptable damage through a well-coordinated retaliatory strike. Nor was the fleet ballistic missile program conceived to defeat an enemy navy;[12] it was specifically designed to fulfill that same objective directly, but with an assuredly survivable force—one which denied the enemy any plausible counterforce option. As with strategic bombardment theories of the 1930s, deterrence theories of the 1950s may seem naive or simplistic today, but they were determinants of the path that led to the present; and they arose from strategic thinking.

seminal strategic thinking came from civilians like George Kennan and Bernard Brodie

Why Has the Flame Dimmed?

From the beginning—when the strategic flame burned most brightly during the first half of the Cold War—some worried that a traditional test of military weapons between armies and navies could force our hand—that we could be self-deterred from being the first to use our nuclear strike forces even as we suffered a traditional defeat. The Korean war lent credence to that argument.

Hence we built up other arms—conventional or tactical to differentiate them from nuclear or strategic—and thus started a destructive division in our minds and institutions that still haunts us. Tactical weapons grew until they dwarfed their strategic counterparts; they even acquired nuclear weapons and found a niche in nuclear war plans. At great cost, they provided the United States and

its allies with an uneasy degree of security in Western Europe and Korea. A warfighting role was even found for these conventional forces in Southeast Asia until we learned to our chagrin that they became hostages that could be extracted only after we resorted once again to strategic strikes against enemy will, values, and resources.

Nevertheless, the strategic flame was much reduced by our attention to conventional arms, not by funding so much as interests. The military has once again built up large vested interests in traditional weaponry—intended to defeat their opposite number in kind, to fight and win wars—to the neglect of other capabilities (such as special operations forces) that might be more directly and adroitly applied to the Nation's highest or ultimate objectives.

In order to retain and modernize traditional arms, our military institutions have contributed to the reduction of the strategic flame. Once again, as occurred earlier in this century, the military—including the aviators—has become mostly rooted in the idea that weapons should be conceived to defeat their opposite numbers in a major regional conflict—with armies confronting armies and air forces opposing air forces. The Navy, with no other significant maritime power to defeat, has oriented itself on projecting power over the land from the sea. But this concept remains mostly operational in nature—about the kinds of units needed to provide presence and project power.[13]

U.S. Air Force (Marvin Lynchard)

F–117 precision bombing.

For the most part, however, the mid-20th century strategic idea that a military can be used for something more pertinent than defeating its counterpart has been pushed into the background. So the strategic flame has dimmed. If it is again extinguished by larger vested interests or neglect we may find ourselves struggling against time to rekindle it once more.

Relighting the Flame

What must be done to rekindle the strategic flame? Reduced resources pose difficulties, but they are not the problem. The flame can be kept burning with even a fraction of today's defense budget. But it can't endure without devotion and spirit. It is easy to have both when institutional fortunes are soaring and assets abound. Keeping faith in ideas rather than things is difficult when institutions and resources are focused on things. As in the case of those strategic pioneers at mid-century, strategic thinkers within the military today may get greater support from the public, from outside the defense establishment. That is altogether fitting, for keepers of the strategic flame serve the Nation even more than they do the institutions to which they belong.

The strategic idea can't always be applied successfully, as history has shown. Sometimes the available technical means are not up to the demands. And sometimes the ends are not apparent. Unfortunately for those devoted to things rather than ideas, new strategic means cannot be defined apart from evolving strategic ends. That was part of the trap into which we fell some fifty years ago by dividing forces along strategic and tactical (nuclear and conventional) lines. It is not that we lack the ability to define strategic means once the strategic ends have been defined; we neglect to spend the effort up front to define and pursue the strategic ends. It is the keepers of the strategic flame who must find strategic ends for applications of military power, for no others will assume that responsibility. It took hard work and acrimonious debate to define the ends for the strategic applications of military forces twice before—and it will again.

How do we attend to strategic ends before the demand arises? In the same manner that we did in the past. No one directed the Air Corps Tactical School to think about economic targeting. No one told LeMay that the means for deterrence was to be found in a comprehensive nuclear war plan. Thinking about strategic ends—and means to achieve them before a threat presented itself—rekindled the strategic flame and set it to burning brightly, at least back in those days.

Thinking about these ends seems daunting. Determinants of the future are in flux on many levels—national interests, resources, threats, and technology. During the Cold War those issues at

least seemed relatively constant; and we became good at hedging against uncertainties with rapidly changing technology. But it is no longer possible to depend on abundant resources or precisely know who or where an enemy will be or what will be required of our military to directly serve the Nation. Contemplating strategic ends across this spectrum can boggle the mind; but it need not if we think strategically instead of tactically.

The strategic applications of military power are about choosing the ways, places, and times to get at the heart of the matter. The initiative lies with us when we think strategically. The burden of strategic thinkers is to explore beforehand what may be worth doing and why. Not only in war, but when friends are isolated—Berlin in 1948 and Bosnia in the early 1990s. Not just for war, but when we need to punish—Libya in 1986 or Bosnia in 1995. Not just to destroy, but when help is needed—the aftermath of Hurricane Andrew and Provide Comfort. Not just to strike, but to know what is going on—over Cuba in 1962 and Rwanda in 1996.

the burden of strategic thinkers is to explore beforehand what may be worth doing and why

Future strategic challenges may include asymmetrical conflicts (as the first world confronts threats in the second and third), terrorism with no definable state roots, and ethnic, religious, and separatist movements. They may involve a proliferation of weapons of mass destruction beyond state controls. The world may see uncontrollable migrations and contraband as borders between nation-states erode. And all this may have to be addressed as traditional nation-state sovereignties and resources decline. Preparing for war, though still necessary, will be insufficient.

The strategic idea is arguably the most important military concept of this century as well as the next. It is a much bigger idea than the one that dominates our military institutions today—warriors being able to defeat other warriors of like kind. It is serving the Nation—more directly, effectively, and efficiently—not just testing new arms one against the other. History tells us that strategic thinking requires courage and perseverance: courage because it demands departures from mainstream thinking and perseverance because it takes time for institutional mainstreams to move and join the "discovered" innovative courses of thought. JFQ

NOTES

[1] In 1955, when the United States was urgently preparing for imminent thermonuclear war with the Soviet Union, the defense budget was $242.8 billion in 1995 dollars. In 1995 the amount was $271.6 billion. From *The Budget of the United States Government for Fiscal Year 1996*, historical tables, reported in *The National Review*, vol. 47, no. 24 (December 1995), p. 21.

[2] For a reprise of *JV 2010*, see *Joint Force Quarterly*, no. 12 (Summer 1996), pp. 34–50.

[3] Even the missile defense debate seems to reflect this point. Only the political discussion addresses strategic concerns, whilst military concerns are mostly tactical.

[4] Not only were bombers diverted to tactical military objectives, the invasion itself had the tactical objective of destroying the enemy. Eisenhower's invasion order (written by himself) was to enter Europe and do just that. At the same time, other leaders advanced strategic objectives such as seizing Berlin (Stalin and Patton) and blocking Soviet occupation of Eastern Europe (Churchill) by invading through the Balkans.

[5] Submarines were aided in that strategic objective by aerial mining, including a number of sorties flown by B–29 bombers then massing in the western Pacific.

[6] The Japanese used submarines mostly for the tactical objective of sinking American naval vessels in open ocean areas of the western Pacific.

[7] See David MacIsaac, *Strategic Bombing in World War Two: The Story of the United States Strategic Bombing Survey* (New York: Garland Publishing, 1976).

[8] In fact, the only confirmed effect so far has been the shooting down of two American Blackhawk helicopters.

[9] Bernard Brodie, editor, *The Absolute Weapon* (New York: Harcourt Brace, 1946), p. 76, as repeated by its author in *War and Politics* (New York: Macmillan, 1973), fn. 2, p. 377.

[10] George F. Kennan writing as "X" in "The Sources of Soviet Conduct," *Foreign Affairs*, vol. 25, no. 4 (July 1947), pp. 575, 582.

[11] Martin van Creveld, "Air Power 2025," in *New Era Security* (RAAF Air Power Studies Centre, June 1996).

[12] Indeed, the Navy sometimes argued that the fleet ballistic missile program served the Nation more than itself and thus should not come out of the Navy budget. See Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: The Johns Hopkins University Press, 1989), pp. 199–200.

[13] Department of the Navy, *Forward . . . from the Sea* (Washington: Department of the Navy, 1994).

U.S. Army

Innovation and Warfighting

Innovation is the enabler of the future. In a seminal article entitled "Revolutions in Military Affairs," James FitzSimonds and Jan van Tol examine how innovation can lead to a revolution. They outline criteria for winning the innovation battle and advocate fostering a military culture that promotes thinking in an unconstrained fashion about future warfighting.

Colin Gray then examines the strategic implications of such revolutions in "RMAs and the Dimensions of Strategy." He argues that RMAs can change the conduct and character of warfare but are not an antidote for strategic ills. The dimensions of strategy are eternal and ubiquitous.

While historians have largely ignored RMAs, Williamson Murray accepts the challenge in "Thinking about Revolutions in Military Affairs." He suggests ways to conceptualize RMAs of the past and interpret the implications of history for the future.

Kenneth McKenzie appeals to history to illustrate the difficulty of harnessing technology to military purposes in "An Ecstasy of Fumbling: Doctrine and Innovation." He looks at the German effort to integrate the technology of gases during World War I. More importantly, he shows how it cost dearly in the short and long term. As he states, we "should not hesitate to apply the lessons in current situations."

Many innovative concepts currently being discussed were framed by Thomas Mahnken in "War in the Information Age," which won first prize in the *JFQ* RMA Essay Contest in 1995. He addresses the need to integrate a myriad of systems: sensors, shooters, and command and control. This will result in shock warfare—actions that foreclose enemy options—and establishes the need to target information nodes. Ultimately, an information advantage will be decisive.

Finally, today's RMA will have an impact on things temporal. It will compress the decision-making cycle and require that operations be planned and executed faster than before. Ajay Singh explores the implications of this phenomenon in "Time: The New Dimension in War." JFQ

U.S. Navy (Daniel G. Lavois)

REVOLUTIONS in Military Affairs

By JAMES R. FITZSIMONDS *and* JAN M. VAN TOL

In the early morning hours of the 15th of May, 1940, Prime Minister Churchill received an urgent telephone call from French Premier Reynaud. "We are beaten," Reynaud said in distressed English, "we have lost the battle." It had only been five days since the German army launched a broad offensive into France and the Low Countries. "Surely it can't have happened so soon," Churchill replied, incredulous at the rapidity of the defeat.[1] Six weeks later, France formally surrendered.

Blitzkrieg has been termed a revolution in military affairs or RMA—a fundamental change in the nature of warfare that the *Wehrmacht* used to inflict a rapid, stunning defeat on a qualitatively comparable, numerically superior force. Many factors contributed to the Allied collapse, but the essence of the German victory was the innovative operational exploitation of systems common to both sides: the tank, airplane, and radio. Speed, surprise, and deception,

Summary

Technological change may revolutionize warfare in the next century. Nations which can exploit emerging technologies through innovative operational doctrine and organizational adaptation may achieve significant gains in relative military effectiveness. In the past, America has had sufficient time to adapt in the midst of war to military revolutions that developed in peacetime. However the proliferation of technology may no longer afford the luxury of observing developments from the sidelines. The role of the military in developing concepts to exploit emerging technologies will be crucial in order to stay ahead of competitors. Junior officers in particular must be encouraged to think about the implications of the emerging revolution in military affairs.

combined with superior tactical and operational performance, gave the Germans a degree of relative operational superiority to which the Allies failed to adapt in time.

While nations have always pursued innovation to increase military effectiveness relative to potential adversaries, accelerating technological change, coupled with associated operational and organizational changes, has altered the character of war more profoundly in the last two centuries than ever before. The railroad, telegraph, steam-powered ironclad, and rifle caused dramatic increases in military effectiveness between the Napoleonic wars and the American Civil War. Similar changes accompanied the introduction of the machine gun, airplane, and submarine prior to World War I. By the outbreak of World War II the internal combustion engine, improved aircraft, radio, and radar made possible revolutionary leaps in long-range, highly mobile operations such as *Blitzkrieg* and carrier air strikes. The development of nuclear weapons at the end of World War II and their subsequent mating with ballistic missiles marked perhaps the most profound revolution in military affairs to date.

The stunning victory of the Armed Forces in the Gulf has stimulated increasing discussion of the possible emergence of a new RMA, which will again lead to major changes in the nature of conventional warfare. Such a revolution may be driven by the rapidly developing technologies of information processing and stealthy, long-range precision strike.

The following discussion has two purposes. The first is to present the question of an emerging revolution in military affairs and suggest why it may be significant. The second—and perhaps more important—is to encourage the readers of *Joint Force Quarterly*, particularly junior officers, to think and write about the explosive technological advances of our day and their implications for the way militaries will be organized and operate in the future.

What Are RMAs?

Whereas we had available for immediate purposes one hundred and forty-nine first-class warships, we have now two, these two being the Warrior *and her sister* Ironside. *There is not now a ship in the English navy apart from these two that it would not be madness to trust to an engagement with that little [American]* Monitor.

—*The Times* (London), 1862 [2]

It is difficult to precisely and consistently define the term *revolution in military affairs*, though it is generally clear *ex post facto* when something of a revolutionary nature has occurred. An example of an RMA might be the universal change across warfare driven, for instance, by the development of the airplane or atomic bomb. Another sort might be the conversion from wooden sailing ships to steam-powered armored hulls in the latter half of the 19th century. Still another might be a consequence of major social or political upheaval, such as the French *levee en masse* which dramatically altered the scale of land warfare. One feature common to each, and perhaps the essence of an RMA, is not the rapidity of the change in military effectiveness relative to opponents, but rather the magnitude of the change compared with preexisting military capabilities.

Technological advances are usually a requisite for an RMA, but technology alone is not enough to achieve leaps in relative military effectiveness. As illustrated by *Blitzkrieg*, profound change only takes place when new concepts of operations incorporating new technologies are developed. Often this will require or result in new military organizations which reflect the new conditions.

History suggests three common preconditions to the full realization of an RMA:

▼ *Technological Development*—Since the Industrial Revolution there has been a stream of new technologies which intentionally or otherwise have had military applications. For example, development of a powerful, reliable internal combustion engine made possible the self-propelled vehicle and airplane. Mere invention, of course, is not enough; the new technologies must also be developed into practical military systems (or systems of systems as technologies become ever more complex). While the tank was introduced at Cambrai in 1917, it was years before it was reliable and robust enough to spearhead rapid ground advances.

▼ *Doctrinal* (or Operational) *Innovation*—To fully exploit the potential of new systems, operational concepts incorporating and integrating the new technologies must be developed into coherent doctrines. Military organizations must also train to use and interactively improve them. After the tank's introduction into combat, it took more

Commander James R. FitzSimonds, USN, and Commander Jan M. van Tol, USN, are assigned to the Office of Net Assessment in the Office of the Secretary of Defense.

U.S. Navy (George F. Champagne)

Experimental stealth ship *Sea Shadow* in San Francisco Bay.

decades of doctrinal experimentation and development to produce *Blitzkrieg*.

▼ *Organizational adaptation*—The most profound changes require significant bureaucratic acceptance and institutional change. The success of *Blitzkrieg* required not only the technology of the tank and a coherent doctrine of armored warfare, but also substantial organizational and even cultural changes which were reflected in the new combined arms operations centered on the German Panzer division.

It is the synergistic effect of these three preconditions that leads to an RMA. Indeed it is the increasing recognition of the importance of the doctrinal and organizational elements that has led to the term *revolution in military affairs* gaining currency over expressions such as *military-technical revolution* which implied that technology was the predominant factor.

prolonged peace provides the time and resources for experimentation

Perhaps counter-intuitively, revolutionary changes do not generally occur during war. The fact of change may be most dramatically manifested in combat, but historically the most profound RMAs are peacetime phenomena (the atomic bomb may be the exception that proves the rule). For example, the transition from wooden sailing ships to steam-powered armored hulls in the last century was one of the more dramatic revolutions in military history, yet there were no major wars at sea in this period which underlined that fundamental change.

Militaries are driven to innovate during peacetime by the need to make more efficient use of shrinking resources, by reacting to major changes in the security environment, or by recognizing the possible implications of

M1A1 Abrams in Saudi Arabia.

U.S. Army

F–117 Stealth fighters.

DOD

new inventions or techniques for their art. Prolonged peace provides the time and resources for experimentation. Equally important, this is the period of least risk if wrong choices are made. Consequently, long periods without major wars have generally resulted in the greatest changes.

Full exploitation of emerging technologies can span decades. The lengthy development of *Blitzkrieg* was noted earlier. Similarly, it took time to move from Kitty Hawk to strategic bombers and carrier task forces. The commercial analog is instructive; for instance, it took business years to fully exploit the telephone's potential or, more recently, exponential increases in computing power.

Is Another RMA Emerging?

In the early 1980s the Soviets noted that "the emergence of advanced non-nuclear technologies was engendering a new *revolution* in military affairs." [3] They were particularly interested in the "incorporation of information sciences into the military sphere" and in the idea of a "reconnaissance-strike complex." [4] The events of the Gulf War convinced them of the validity of their hypothesis.[5] Desert Storm indeed suggests that a new RMA is emerging.[6] It may have provided a glimpse of a major transition to a different type of warfare heavily based on information processing and stealthy long-range precision strike weapons. What are some of the possible implications of this transition?

Information processing has always been part of warfare. In the future, however, it may be central to the outcome of battles and engagements. If so, establishing information dominance over one's adversary will become a major focus of the operational art. Information warfare is still an ill-defined term. However, it might encompass a range of concepts, including but not limited to:

- comprehensive intelligence regarding an enemy's military, political, economic, and cultural "targets" while denying the same to him
- disruption/manipulation of enemy C^3I systems and defense of one's own
- space-based information usage and denial
- sensor-to-shooter data fusion
- flexible information/intelligence data bases
- use of simulations to support operational decisionmaking.

To the extent these notions have operational validity, they may also drive significant organizational changes.[7]

Stealthy long-range precision strike may become the dominant operational approach. By reducing the strike timeline from target sensor-to-shooter by orders of magnitude while increasing the effectiveness of weapons in terms of range, target discrimination, and lethality, such systems conceivably could provide conventional forces the ability to rapidly destroy an opponent's critical military targets at minimal cost and with little collateral damage. Some proponents even believe this approach extends to the destruction of an enemy's strategic centers of gravity.

There may well be other technologies, employed operationally in ways as yet unforeseen, that emerge to dominate future wars and preparations for them. Use of advanced simulations may greatly reduce cost and increase the speed of various military

Joint Combat Camera Center

Navy F/A–18C.

U.S. Navy (Jon Guzman)

***USS Monsoon*, a new class of coastal patrol ship, off the San Clemente Islands.**

activities. Commercial technologies such as microelectronics, telecommunications systems, space systems, nanotechnologies, robotics, and biogenetics, whose potential is only starting to be explored and which will be widely available, may also have enormous implications for military effectiveness. Moreover, these technologies and their operational employment may radically affect the whole gamut of military affairs, from combat operations and training to logistics and deployment practices to optimizing the responsiveness and flexibility of the industrial base.

there is a substantial cost for failure to recognize revolutionary changes in warfare

In thinking about the proposition of an emerging RMA, it may be instructive to compare the present with the interwar years. By 1918, systems like planes, tanks, and radios were considered state of the art and represented quantum leaps over 1914. Yet the combat power represented by these same systems in 1940 was orders of magnitude greater than in 1918. The promise they held in 1918 only became decisive after two decades of technical improvement, doctrinal development, and organizational adaptation. Could the *modern* systems such as stealth aircraft, cruise missiles, and smart weapons, the concepts of operations that employed them, and the military organizations of the Gulf War be the "1918" equivalents in the context of a future "1940" war?

Why Do RMAs Matter?

RMAs matter principally for two reasons. First, being second best may lead to catastrophic loss in future wars. Since the only objective benchmark for determining the relative effectiveness of forces (that is, success in combat) is unavailable in long periods of peace, there is great potential for asymmetries in combat effectiveness between militaries, observable only when the next war has occurred. For example, the British and French experimented with tanks and aircraft in the interwar period, but their effectiveness was disastrously inferior to that of the *Wehrmacht*. However, few observers would have guessed at this reality in 1939. Obviously, there is a substantial cost for failure to recognize revolutionary changes in warfare before an opponent does.

Secondly, as equipment life cycles, especially for platforms, steadily grow to encompass decades (B–52s were designed in the late 1940's, carriers last 40-plus years), many of the principal weapons systems of 2025 will likely be designed and built in the next

few years. Since militaries are stuck with force structures they choose for long periods (though designs allowing for frequent system modifications ameliorate this to some extent), it is more crucial than ever to think now, in peacetime, about the impact of possibly revolutionary changes in the nature of war and about what will matter in winning wars in twenty or thirty years. Paradoxically, however, this may be more difficult even as it becomes more important.

Today, with the United States arguably the only superpower for the foreseeable future, one might ask why this issue is especially pressing. Replicating the U.S. force structure is clearly beyond the reach of all but a few other nations, even in the long term. This may not, however, be relevant. Even small- to medium-sized powers may be able to exploit specific technologies for significant military leverage in certain areas. Fifty years ago the Japanese fielded a highly capable military, technically advanced in selected aspects, which was more than a match for American forces during the early years of the Pacific war. Yet Japan's economy on the eve of World War II was maybe 15 percent the size of this Nation's. A more serious possibility is the emergence of a major competitor or coalition to seriously challenge the United States. Such a military peer might employ the same critical technologies which will serve as the basis of our Armed Forces and thus pose a direct threat to American vital interests.

The current rate of change suggests that *state of the art* in any technological context will be an extremely short-lived phenomenon, particularly with respect to the technologies that were key to the success of Desert Storm: space systems, telecommunications systems, computer architectures, global information distribution networks, and navigation systems. Future revolutions will occur much more rapidly, offering far less time for adaptation to new methods of warfare. The growing imperative in the business world for rapid response to changing conditions in order to survive in an intensely competitive environment is surely instructive for military affairs. Corporations repeatedly have to make major changes in strategy to accommodate the full implications of technologies which have already existed many years.

In the military context, as with the tank, aircraft, radio, and other systems in 1918, the key technologies are out there and available for many nations to exploit. This places a premium on remaining at the forefront in the identification and implementation of the developments which will maintain, if not increase, relative military effectiveness well into the next century. Doing so can only come from encouragement of innovative thinking about the relevant questions.

Innovative Thinking

Stationed at Camp Meade, Maryland just after World War I, Dwight Eisenhower and George Patton both began articles for military journals describing their experiments utilizing new doctrine for the employment of tanks. "Then I was called before the Chief of Infantry," Eisenhower later recalled. "I was told that my ideas were not only wrong but dangerous and that henceforth I would keep them to myself. Particularly, I was not to publish anything incompatible with solid infantry doctrine. If I did, I would be hauled before a court-martial." [8]

Today's breathtaking technological achievements notwithstanding, developing the concepts of operations that incorporate new technologies and organizations to permit effective exploitation of new capabilities is even more critical than acquisition of the technologies themselves. Indeed, the most compelling lesson from the 1920s and 1930s is that some militaries were much better than others at developing and implementing successful concepts and also making the organizational changes to fully exploit new technologies.

Innovation is not necessarily or even primarily a function of budget. Many of the interwar innovations came at a time of low budgets and small forces. *Blitzkrieg* was developed while Germany was tightly restricted by the Versailles Treaty. American carrier naval aviation developed under a

GENERAL HEINZ GUDERIAN
(1888-1954)

Between 1914 and 1918 [Guderian] served mainly with the staff on the Western Front. In 1922 his task was to help develop the mechanization of the German army: by 1929 he had become convinced that tanks in all-arms, armoured (*Panzer*) divisions would in the future dominate land warfare. With Hitler's support, but obstructed by traditionalists, he promoted the creation of the German armoured forces which spearheaded the invasion of Poland in 1939.

— From *The Penguin Encyclopedia of Modern Warfare* by Kenneth Macksey and William Woodhouse

strict arms control regime in a fiscally constrained environment. The amphibious doctrine of the Marine Corps—which J.F.C. Fuller characterized as probably "the most far reaching tactical innovation of the war"—originates in the conceptual work of Major Earl H. Ellis in 1920 under the visionary tutelage of the Marine Commandant, Major General John A. Lejeune.

Why some innovations succeed and others fail, and why some militaries innovate rapidly while others languish, are matters for debate.[9] History provides no clear guidance on overcoming institutional resistance to change and no final explanations of the relative roles of civilians, military mavericks, or visionaries. However, in one form or another, the military role in implementing innovative ideas is crucial. As one observer noted, "many important wartime technical innovations such as the tank, proximity fuse, and microwave radar, and organizational innovations such as new doctrines for submarine warfare and strategic targeting functions for American bombers, were pursued at the initiative of military officers or with their vigorous support." [10]

What may be key to "winning the innovation battle" is a professional military climate which fosters thinking in unconstrained fashion about future war. This is in part a function of having leaders on the order of a LeJeune who will encourage innovation and—subject to reality checks—actually test and implement innovative ideas to maintain a preeminent military position.

Patriot missile system.

Joint Combat Camera Center

The other critical requirement is the ability and willingness of relatively junior officers who are now out in the field and fleet to think about the future. As younger people more recently out of school, they are likely to be in closer touch with new and emerging technologies which have potential military application. As operators, they are aware of the operational and organizational problems that they must deal with daily and hence are prime clients for possible solutions. Finally, they will also be the senior leaders who must win the wars twenty to thirty years from now.

Unfortunately, these same officers have published little to date in professional journals on the idea of an RMA, nor have RMAs been a focus of study at the service colleges.[11] There may be several reasons for this. Arguably the present force drawdowns put such a premium on preserving what exists that discussion of concepts which might threaten current programs is effectively stifled. Then organizations that have had recent success, as has the U.S. Armed Forces, probably feel less impetus for institutional change than if they had been less successful. And lastly, countries have historically not had good records of military innovation in periods such as the present when they cannot envision a well-defined military problem as the focus of planning and acquisition.

The failure of military officers to think about potentially crucial ideas such as an emerging RMA can carry with it the seeds of defeat, not least because the absence of a significant military contribution to the discussion of future wars will result in the subject being restricted to academics and think tanks. Although the latter have important ideas to bring to the table, inherently they can neither be as intimately familiar with military problems as professional officers nor as effective in implementing innovation from within the services.

Journals such as *JFQ* should play an important role in giving exposure to new ideas. Military officers, especially junior ones, should contribute views on emerging RMAs, or at least evaluate the implications of the stunning changes occurring today. As a starting point, the authors suggest the following broad questions:

▼ How will the emerging RMA change the nature of warfare in the next several decades?

BRIGADIER GENERAL WILLIAM ("BILLY") MITCHELL (1879–1936)

. . . by September 1918 [Mitchell] was commander of a Franco-American air force of 1,500 machines. He used the force in mass (sometimes with formations of 200 aircraft) in the Saint-Mihiel battle and the Meuse Argonne offensive. By then he was a fervent champion of airpower, proposing the parachuting of airborne infantry behind the German lines in 1919, and of strategic bombing by independent air forces on the British model.

— From *The Penguin Encyclopedia of Modern Warfare* by Kenneth Macksey and William Woodhouse

▼ What military applications do burgeoning commercial technological developments have?

▼ What implications do new technologies have for concepts of operations? For the way the military is organized?

▼ How might potential adversaries exploit the military revolution to America's detriment?

▼ What should the U.S. strategy be for dealing with future military competitors? Should such a strategy aim at inhibiting those competitors?

These questions are just a starting point. Indeed, figuring out what the right questions are is a challenge in itself. But assuredly, officers must think beyond the issues of force drawdowns and the Five-Year Defense Plan. As Paul Bracken has pointed out, "We should be looking beyond the military we are planning to have at the end of our current force restructuring—we should be planning now for the 'military after next.'" [12] JFQ

NOTES

[1] Winston S. Churchill, *Their Finest Hour* (Boston: Houghton Mifflin, 1949), p. 2.

[2] Quoted in John Taylor Wood, "The First Fight of Iron-Clads," in *Battles and Leaders of the Civil War* (New York: Thomas Yoseloff, 1956), p. 692.

[3] Mary C. FitzGerald, "The Soviet Image of Future War: Through the Prism of the Gulf War," *Comparative Strategies,* vol. 10, no. 4 (October–December 1991), p. 393.

[4] Ibid., p. 398.

[5] Mary C. FitzGerald, "The Soviet Military and the New Air War in the Persian Gulf," *Airpower Journal,* vol. 5., no. 4 (Winter 1991), p. 64.

[6] The emerging nature of RMAs is the subject of an unpublished manuscript by Andrew F. Krepinevich, Jr., entitled "The Military Revolution."

[7] A cogent proposal for consolidating information management recently appeared in these pages: see Martin C. Libicki and James A. Hazlett, "Do We Need an Information Corps?", *Joint Force Quarterly*, no. 2 (Autumn 1993), pp. 88–97.

[8] Dwight D. Eisenhower, *At Ease: Stories I Tell to Friends* (New York: Doubleday, 1967), p. 173.

[9] See for example Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, N.Y.: Cornell University Press, 1991); Barry Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars* (Ithaca, N.Y.: Cornell University Press, 1984); and James S. Corum, *The Roots of the Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence, Kans.: University Press of Kansas, 1992).

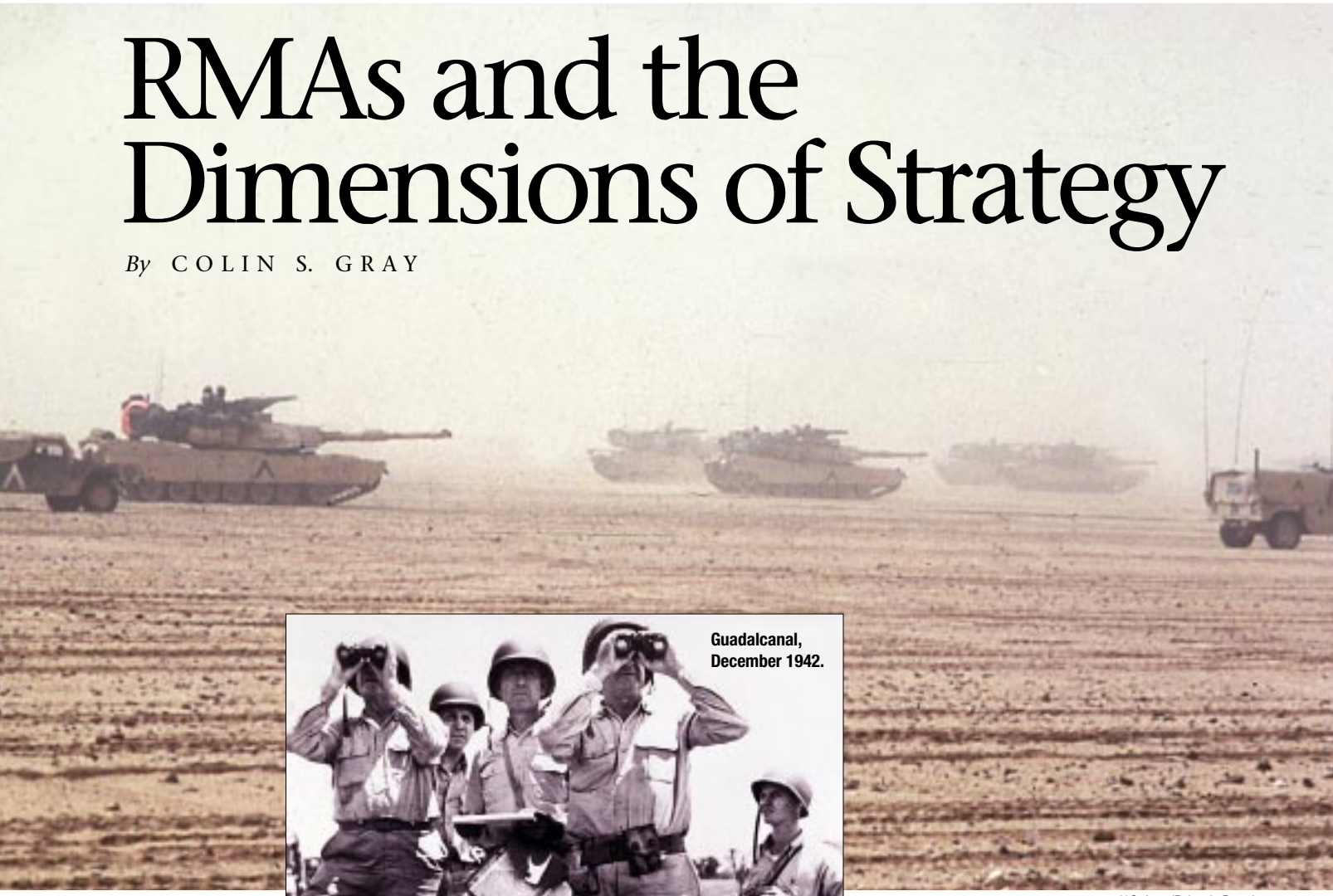
[10] Rosen, *Winning the Next War*, p. 255.

[11] Antulio J. Echevarria and John M. Shaw, "The New Military Revolution: Post-Industrial Change," *Parameters,* vol. 22, no. 4 (Winter 1992–93), pp. 1–10, and John W. Bodnar, "The Military Technical Revolution: From Hardware to Information," *Naval War College Review,* vol. 46, no. 3 (Summer 1993), pp. 7–21, appear to be the only articles on RMAs in professional military journals in 1993.

[12] Paul Bracken, "The Military After Next," *The Washington Quarterly*, vol. 16, no. 4 (Autumn 1993), pp. 157–74.

RMAs and the Dimensions of Strategy

By COLIN S. GRAY



On the offensive in Kuwait.

U.S. Army (Robert L. Reeve)

Guadalcanal, December 1942.

U.S. Marine Corps

Strategy and war are holistic enterprises. U.S. strategic culture is wont to function taking one thing at a time on its own merits. Monochronic defense performance leads to a focus on only one or two dimensions of what is almost always a more complex challenge. Strategy has a variety of dimensions, each of which matters though differently from one historical case to another. Each has the potential to undo a strategic venture. The generic dimensions of strategy are ubiquitous and fixed, but their details often change. The grammar of strategy can altar radically, even to the point where one can argue that a revolution in military affairs (RMA) has occurred. Presently I identify 17 working dimensions of strategy: ethics; society; geography; politics; people; culture; theory; command (political and military); economics and logistics; organization (including defense policy and force planning); military preparation (administration, research and development, procurement, recruitment, training, and numbers or mass); operations; technology; information and intelligence; adversary; friction, chance, and uncertainty; and time. Some (like technology or command) figure more prominently than others, but none can be taken for

Colin S. Gray is the director of the Centre for Security Studies at the University of Hull; his books include *The Leverage of Sea Power: The Strategic Advantage of Navies in War.*

granted. Having so many interdependent dimensions means that advantages derived from improving one are seriously limited.

Two Schools

Cultural anthropologists note that America is a preponderantly monochronic culture, which means that it considers challenges one at a time, in isolation, pragmatically.[1] As a result national strategy in the United States reflects this one-thing-at-a-time, each-on-its-merits approach. Defense intellectuals have a way of validating the Watergate investigatory tactic of "following the money." The trail of dollars for studies leads from one "big idea" to another—monochronically. Although there is essential unity, indeed a polychronicity, to strategic experience, defense issues rapidly fall into and out of fashion. There has been controversy over détente, nuclear strategy, ICBM basing, SDI and more SDI, competitive strategies, and so forth. The tide of issues comes in regularly with new or new-sounding ideas, and then inexorably it goes out. Today it is RMA and information warfare. To point out the fluctuating nature of these issues is not to dismiss them; but it is to admit that only historical perspective can reveal just how useful they are.[2]

the historical school argued that strategy and war are unchanging in their essentials

Herman Kahn was a defense intellectual whose primary instinct was to put things together rather than disassemble them for monochronic, piece-by-piece analysis.[3] One cannot emulate his genius, but one can follow his methodology. This article presents strategy and war holistically with emphasis on the totality of the subject no matter how formidable it may appear. Indeed, the more a strategic phenomenon is examined, the more complex it seems. Readers may have noticed that the more professional historians scrutinize military experience, the more RMAs appear. It is not unlike probing the universe with more powerful telescopes. When additional historians join in the debate, they are apt to attest to the plausible existence of one or more RMAs in their century no matter what their periods of expertise may be.[4]

A hard core of interconnected ideas forms the thread of this argument, specifically:

- Strategy and war have many dimensions (while 17 is my preference, the list is open).
- Every dimension matters though interaction among them varies from case to case.
- All dimensions of strategy matter so much that a severe national or coalition disadvantage in any one can have a lethal strategic effect overall.
- Dimensions of strategy and war are generically as eternal and ubiquitous as their details, and like details of their interconnections change from one context to another. The nature and structure of strategy are effectively immortal.[5]
- But the character and conduct of war (or to misquote Clausewitz, who wrote of its "grammar"), the grammar of strategy, how strategy is achieved by tactics,[6] must change—possibly radically—along with political, social, economic, and technological conditions.
- Although the nature and structure of strategy and war remain constant, changes in the character and conduct of war can arguably be described as revolutions in military affairs. The term *revolution*, however, does risk devaluing those variables that change more slowly.
- It follows that we know a great deal about strategy and war; and, *ipso facto*, we know quite a lot about what we do not and cannot comprehend.

While this argument is profoundly conservative, it allows for the certainty of change. Early in the 20th century the rapid pace of technical and thus tactical developments in Britain provoked bitter debate in the Royal Navy between "material" and "historical" schools of thought.[7] Advocates of the former asserted that great—even not so great—technical change meant that the entire subject of war, at all levels and in all dimensions, was effectively changed or revolutionized. The rival historical school argued that strategy and war are as unchanging in their essentials as technology and tactics are permanently in flux. The terms of this debate in the 1900s between materialists like Admiral Jackie Fisher and historical thinkers like Admiral Reginald Custance still persist to this day with evolving levels of detail. To the material school the world may be made over whenever a new technology comes along.

Everything Matters

Michael Howard provided the most direct stimulus to thought on the dimensions of strategy by identifying the logistical, operational, social, and technological.[8] Writing within the context of an active debate about SALT II and nuclear strategy, Howard was concerned that the United States appeared to be focusing unduly on the technological at the expense of the social and operational.

When considering strategy vis-à-vis the debate over RMA and information warfare, I prefer to use no fewer than the 17 dimensions already mentioned. These work with, on, and around each other simultaneously. Anyone who argues that strategy really has only one or two dimensions will oppose this approach. One should be reluctant to rank-order the dimensions of strategy; hence the order in which they are cited above is largely random. By analogy, the model range for auto makers typically emphasizes engine type and size as leading edge or dominant


DOD (Helene C. Stikkel)

Briefing Secretary Cohen, Bosnia.

for each vehicle in its range. Nonetheless, cars cannot operate without drive trains, electrical systems (including batteries), or tires. Furthermore, there are restrictions on what improvements to automotive dimensions can achieve unless balancing refinements are made in others. Twin turbos are nice to have, but not without better brakes and tires and—returning to the question of strategy—a better driver.

An excellent military may, even with faulty political guidance, fight the wrong war well. Conversely, a wretched force may fight the right war badly. The primary point is the stupefyingly obvious one that everything matters. The secondary point is that even wonderful improvements in military effectiveness—as might be delivered by U.S. forces multiplied by the so-called "system of systems" [9]—are likely to disappoint if political leadership is poor. After all, Germany was second to none in fighting during two world wars, but it was awesomely incompetent in waging war.

Beyond Geography

There is no correct answer to the question: How many dimensions are there to strategy? The exact numbers or labels of the dimensions do not matter, but it is important that everything of significance about strategy has been included somewhere among them. A country or coalition need not be outstanding or even excellent in all dimensions of strategy. Wars can be won—which is to say, enough strategic effect can be generated—despite unsound plans, uninspired political leaders, undistinguished generalship, bad luck, or inconvenient geography. Three points require prompt registration. First, each dimension is a player. It is part of national strategy—in every conflict, in every historical era.

Second, some substitution is feasible among, between, and even within the dimensions of strategy.[10] It is rare for a nation to be equally competent on land, at sea, in the air, and in space (or cyberspace). Or, in the case of Germany's *Östheer* (its army in the East), the quality and quantity of one side's technology may be degraded during the course of war, but some useful compensation may be found in the realm of motivation (fighting spirit, morale, and ideology). Or information on an enemy may be in short supply, but some mix of luck, better logistics, superior organization, and higher morale may enable a nation to survive unpleasant surprises. Yet specific circumstances always differ. Because of inadequate operational information, Anglo-French forces were taken by surprise in both World War I and II, recovering from their ignorance in 1914 but not in 1940.

Third, there is, or should be, a level of competitive performance in each dimension which, if one falls below it, has the inexorable consequence of adversely deciding the conflict. You lose.

The argument advanced is that a whole range of strategic dimensions influences conflict, not just those either preferred or designated. Which among them does not matter? It has been debated whether geography matters much in the age of cyberspace.[11] If cyberspace rules, and cyberpower is everywhere and nowhere (placelessly "beyond geography"), perhaps we are witnessing a radical departure from previous strategic experience. Yet perhaps there are grounds for skepticism.

no general theory of strategy can truly be proof against folly or bad luck on a heroic scale

The argument that the holistic nature of strategy and war can be ignored only at one's peril is considered by one analyst who advises that "Human limitations, informational uncertainties, and nonlinearity are not pesky difficulties better technology and engineering can eliminate, but built-in or structural features of the violent interaction between opposing groups we call war."[12] To take just one of these features, the limits in the human (and command) dimension of strategy can easily restrict or offset any gains of a technological edge. (And the human dimension plays at every level of conflict from tactics to statecraft.)

If one accepts the promise of immaculate performance by technology-rich, information-led warriors, what can one assume about U.S. competitiveness in other dimensions of strategy? Is it reasonable to anticipate excellence in political leadership, enthusiasm on the part of the public, and superiority in making, executing, and monitoring the means of strategic performance?[13]

Cookbook Strategy

Whether or not one thinks appropriately about an RMA or implements one competently in all its requisite aspects (technology, weaponization, doctrine, training, organization, acquisition of critical mass of numbers) may have little actual bearing on future U.S. strategic performance. This is because the friction that degrades national performance most insistently may well lie between the government and the Armed Forces, or between the government and society. This is not a rebuke of military modernization or hostility toward the concept of RMA, nor by implication a critique of information warfare in its several guises. Instead, it is simply an argument that countries conduct conflict, wage wars, and make and execute strategy as a whole. Clausewitz made this point clearly when he referred to the trinity of passion, uncertainty, and reason, which are associated primarily with the people, the army and its commanders, and the government respectively.[14] Unfortunately, there is little analysis in *On War* about the vital subject of the difficulties that can and do arise when policy and military instruments are not both excellent and operating in harmony.

There is no need to belabor the blindingly obvious point that the dimensions of strategy are interdependent. However, it may be worth offering the caveat that to every robust-looking theory there is apt to be the odd exception. One should recall that Clausewitz, unlike Jomini, declined to offer a cookbook of rules for strategy.[15] Hence the argument here has a Clausewitzian rather than a Jominian message. No general theory of strategy or architecture of understanding can truly be proof against folly or bad luck on a heroic scale. Although it is true that each dimension of strategy is important and poor performance in any one could decide the ultimate outcome of a conflict, and that no degree of superiority in any one or two can deliver victory if performance elsewhere is too low, an exception is always possible in practice. Military genius (or folly) on a heroic scale writes or rewrites the principles of strategy.

Again, the nature, purpose, and structure of strategy are eternal and ubiquitous. Any war, in any period, between any adversaries (like or unlike), can be understood with reference to these particular dimensions. What must vary, however—sometimes quite radically—is the detail of the complex interplay among and within them. But when advocates of the historical school claim that strategy is strategy and war is war regardless of the time, place, adversaries, and technology, this is what is meant. Clausewitz, Jomini, Mahan, and Liddell Hart were right in stating that the nature of strategy and war does not, indeed cannot change. The components and structure of the subject remain constant—only the details change. Each dimension of strategy considered above played a part in the Peloponnesian War, the Punic Wars, and the Crusades.

The complexity of war and the diversity of the instruments of strategy with which we wage it have increased over the past century. Technology, tactics, doctrine, and organization have been adjusting to experience and in anticipation of the advantages to be gained or the disadvantages to be avoided. Novel though each additional environment for war certainly is, however, we find that as we have proceeded to fight in the air, to consider combat in and for space and in cyberspace—as well as on land and at sea—the same rules govern strategic performance everywhere. Whether or not forces specialized for combat in

various geographies (or perhaps anti-geography in cyberspace) can win wars by independent action, each must follow the guiding rule of classical strategy. That rule mandates securing military control in each geography as a prerequisite for strategic exploitation. The same logic applies for land, sea, air, space, and cyberspace. If sea, air, or cyberspace forces are to exercise their roles as team players, each must first succeed in its distinctive environment. To understand why one must be ready to fight at sea is to grasp why one must be ready to fight in the air, in space, or in cyberspace. The logic of strategy and war is the same.[16] If an environment is militarily important, we must be ready to fight for the right to use it.

Overall, we know almost everything that we need to know, and probably all we can know, about the future of strategy and war. Indeed, if one is willing to engage in reductionism, it can be claimed that Thucydides recorded almost everything worth considering about the causes of war and the political need for strategy by emphasizing just three impulses: fear, honor, and interest.[17] It is not obvious that modern scholarship on the motives for empire or the causes of war has produced conclusions superior to that trinitarian hypothesis.[18]

What is not known about the future of strategy and war is almost all of detail, significant and insignificant. Many pundits have a weakness for invoking the phrase "the foreseeable future." But the future has not happened and cannot be foreseen in detail. Under political guidance that is certain to be unsatisfactory, likely to contain contradictions, and almost bound to bear the stamp of some unsound assumptions, defense planners are obliged to decide what is a good enough defense establishment when one cannot know precisely whether, when, where, or for what ends war will be waged. But if it is any consolation, at least they know what strategy and war are made of—the 17 dimensions—and should be rendered immune by education, including the education provided by experience, to persuasion by unsound theories of miracle cures for strategic ills. JFQ

NOTES

[1] Edward T. Hall, *Beyond Culture* (Garden City, N.Y.: Doubleday, 1976).

[2] See the discussion in Colin S. Gray, *The American Revolution in Military Affairs: An Interim Assessment*, Occasional Paper 28 (Camberley: Strategic and Combat Studies Institute, Joint Services Command and Staff College, 1997).

[3] Kahn's instinct for synthesis is represented in *On Escalation: Metaphors and Scenarios* (New York: Praeger, 1965).

[4] For example, see Clifford J. Rogers, ed., *The Military Revolution Debate: Readings on the Military Transformation of Early Modern Europe* (Boulder, Colo.: Westview, 1995).

[5] This argument is a central theme in Colin S. Gray, *Understanding Modern Strategy* (Oxford: Oxford University Press, forthcoming).

[6] Carl von Clausewitz, *On War*, edited and translated by Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), p. 605.

[7] Battlelines for debate were drawn most clearly in Reginald Custance, "Introduction" to "Barfleur," *Naval Policy: A Plea for the Study of War* (Edinburgh: William Blackwood and Sons, 1907), pp. vii–ix.

[8] Michael Howard, "The Forgotten Dimensions of Strategy," *Foreign Affairs*, vol. 57, no. 5 (Summer 1979), pp. 975–86.

[9] James R. Blaker, *Understanding the Revolution in Military Affairs: A Guide to America's 21st Century Defense*, Defense Working Paper 3 (Washington: Progressive Policy Institute, January 1997).

[10] See Andrew G.B. Vallance, *The Air Weapon: Doctrines of Air Power Strategy and Operational Art* (London: Macmillan, 1996), chapter 2.

[11] See both Colin S. Gray, "The Continued Primacy of Geography" (and "A Rejoinder"), and Martin Libicki, "The Emerging Primacy of Information," *Orbis*, vol. 40, no. 2 (Spring 1996), pp. 247–59, 261–76.

[12] Barry D. Watts, *Clausewitzian Friction and Future War*, McNair Paper 52 (Washington: National Defense University Press, October 1996), p. 122.

[13] On strategy as process, see Williamson Murray and Mark Grimsley, "Introduction: On Strategy," in Williamson Murray, Macgregor Knox, and Alvin Bernstein, eds., *The Making of Strategy: Rulers, States, and War* (Cambridge: Cambridge University Press, 1994), chapter 1.

[14] Clausewitz, *On War*, p. 89.

[15] Contrast Clausewitz, *On War*, p. 141, with Antoine Henri de Jomini, *The Art of War* (Novato, Calif.: Presidio, 1992), pp. 16–17, 70, 114. Michael I. Handel, *Masters of War: Classical Strategic Thought*, 2d ed. (London: Frank Cass, 1996), offers a comparative treatment.

[16] This proposition pervades Edward N. Luttwak, *Strategy: The Logic of War and Peace* (Cambridge, Mass.: Harvard University Press, 1987).

[17] Robert B. Strassler, ed., *The Landmark Thucydides: A Comprehensive Guide to the Peloponnesian War* (New York: Free Press, 1996), p. 43.

[18] See Donald Kagan, *On the Origins of War and the Preservation of Peace* (New York: Doubleday, 1995), which is influenced by Thucydides; and Hidemi Suganami, *On the Causes of War* (Oxford: Clarendon Press, 1996).

Thinking About Revolutions in Military Affairs

1st Combat Camera Squadron (James D. Mossman)

By WILLIAMSON MURRAY

The term *revolution in military affairs* (RMA) is a buzzword inside the Beltway and among academics interested in defense affairs. As Dennis Schowalter noted at a recent conference, "RMA has replaced TQM [total quality management] as the acronym of choice" among members of the Armed Forces. One suspects that much of this enthusiasm, which rests upon only the slightest knowledge of the historical record, may distort as much as it helps in thinking about military change and innovation. Yet one must also admit that military events of late suggest major changes in technology and weapons with substantial implications for conducting war in the next century.

This article suggests how one might think about RMAs of the past and the implications of the historical record for the future. The views reflect the influence, comments, and thoughts of colleagues in the historical profession.[1]

First, historians have done relatively little work on RMAs. Michael Roberts introduced the idea of a single military revolution in his inaugural lecture at Queens University Belfast in 1955. Thereafter until 1991, interest in *the* military revolution was focused on the 16th and 17th centuries; early modern historians argued among themselves about whether there was such a revolution and, if so, when it occurred and what form it took. That debate continues. Since the mid-18th century, however, military historians have concentrated on other issues such as innovation, effectiveness, adaptation, organizational behavior, or—the bread and butter of the profession—battle

Williamson Murray, professor emeritus at The Ohio State University, is the Charles A. Lindbergh Visiting Professor of Aerospace History at the National Air and Space Museum, Smithsonian Institution.

Figure 1. Possible RMAs

14th century
—longbow: *cultural*

15th century
—gunpowder: *technological, financial*

16th century
—fortifications: *architectural, financial*

17th century
—Dutch-Swedish tactical reforms: *tactical, organizational, cultural*
—French military reforms: *tactical, organizational, administrative*

17th–18th centuries
—naval warfare: *administrative, social, financial, technological*

18th century
—British financial revolution: *financial, organizational, conceptual*
—French Revolution: *ideological, social*

18th–19th centuries
—industrial revolution: *financial, technological, organizational, cultural*

19th century
—American Civil War: *ideological, technological, administrative, operational*

late 19th century
—naval war: *technological, administrative, cultural*

19th–20th centuries
—medical: *technological, organizational*

20th century
—World War I: combined arms: *tactical, conceptual, technological, scientific*
—*Blitzkrieg*: *tactical, operational, conceptual, organizational*
—carrier war: *conceptual, technological, operational*
—strategic air war: *technological, conceptual, tactical, scientific*
—submarine war: *technological, scientific, tactical*
—amphibious war: *conceptual, tactical, operational*
—intelligence: *conceptual, political, ideological*
—nuclear weapons: *technological*
—people's war: *ideological, political, conceptual*

histories. Modern historians quite simply have not been very interested in military revolutions.

In a sparsely attended session at the March 1991 meeting of the Society of Military History, Clifford Rogers suggested that there was not one military revolution but a series that reached from the middle ages to the present day. He said they may have begun as early as the 14th century and continued with increasing frequency as one neared this century. Not surprisingly there has been a rush to examine virtually everything from the strategy of Edward III to *Blitzkrieg* operations in the light of what we call *revolutions in military affairs*. The crucial point is that the historical record is not yet in; and until there is detailed research on the subject most commentaries may be distortive. At a recent conference, I listed possible RMAs along with the driving forces behind them. Although not inclusive, it suggests the complexities and ambiguities found in the historical record (see figure 1).

The list suggests a number of points. First, given the enthusiasm for describing the coming RMA as technological, the historical record suggests that technological change represents a relatively small part of the equation.[2] Moreover, military history over the last eighty years offers many cases in which forces with inferior technology have won conflicts. The record further suggests that the crucial element in most RMAs is conceptual in nature. In the breakthrough on the Meuse, for example, the German advantage was a combined arms doctrine resting on a thorough and realistic appraisal of the last war. Their opponents had not developed such a doctrine.[3]

In fact there is only one example on the list of possible RMAs that is entirely technological: nuclear weapons. But even here there is some ambiguity since the impact of nuclear weapons has been almost entirely political except for their first use against the Japanese. Outside of great power competition, nuclear weapons have *not* changed the nature of warfare. What the historical record implies, therefore, is that technology has played only one part in these revolutions, and frequently a relatively insignificant part.

Secondly, the record suggests that historians and others using the concept should rethink RMA terminology. Even the idea of a series of revolutions distorts history and misses a number of complex and ambiguous interactions. The current reading of the evidence indicates a linear series of discrete revolutions that are readily discernable and therefore easily managed.

Military Revolutions

Evidence, however, points in another direction.[4] There appear to be two distinct historical phenomena involved in radical innovation and change. The first can be called military revolutions. These were by far the more important, for they fundamentally changed the nature of warfare in the West. There appear to have been four (two occurring at the same time): creation of the modern, effective nation-state based on organized and disciplined military power in the 17th century; the French Revolution and the industrial revolution beginning at the same time during the period 1789–1815; and World War I, 1914–18. We might compare them in geological terms to earth-

Naval Historical Center

Battery Sherman, Vicksburg.

quakes. They brought with them such systemic changes in the political, social, and cultural arenas as to be largely uncontrollable, unpredictable, and above all unforeseeable. Therefore those who expect the "information revolution" to bring radical social and cultural changes—if they are correct—will find that the direction, consequences, and implications of such a revolution will be largely unpredictable for both society and military organizations.

Such "military revolutions" recast the nature of society and the state as well as of military organizations. By so doing they altered the capacity of states to project military power and allowed the military to kill people and break things ever more effectively. Moreover, these revolutions do not replace but rather overlay each other. Consequently, all the new technology in the world will not help an Iraqi army fight coherently on the modern battlefield because Iraqi society has not gone through the creation of a modern state, and the government lacks the capacity to infuse its citizens with the fervor of the French Revolution. On the other hand, a Vietnamese communist movement, which combined the revolutionary enthusiasm and fervor of the French Revolution in a xenophobic culture, defeated two great Western powers.

"military revolutions" do not replace but rather overlay each other

These four military revolutions raise a number of points. The 17th century revolution laid the basis for the modern state. Until that point, armies and navies were under only the loosest control of central governments. Their employers more often than not failed to pay the troops who in turn looted and pillaged. The result was the catastrophe of the Thirty Years War which devastated Germany and the sack of Antwerp where unpaid Spanish soldiers mutinied, thus undermining Spanish policy in the Netherlands. The action of the Spanish soldiery reflected both their disobedience and the inability of the state to compensate them. The 17th century revolution created military organizations that in Machiavelli's conception not only imposed the laws but responded to them in civil as well as military terms. As the Swedish Articles of War in the early 17th century made clear, soldiers would dig when they were told to dig—a conception that had not always marked the performance of warriors in the Middle Ages. In the macro sense, the European military organizations that emerged in the 17th century were more effective on both the battlefield and in the conduct of civil affairs because they were responsive to the orders of the state bureaucracy. Once the state was able to collect taxes it could pay soldiers on a regular basis; in turn, it demanded that soldiers maintain discipline on the battlefield and in garrison. We take for granted the discipline and responsiveness of Western military institutions and their imitators (such as the Japanese and Indians); but the history of South America and much of the Third World over the past forty years suggests that this political relationship is not always a given.

The French Revolution established the norms for the mobilization of economic, scientific, and popular resources. It interjected ideology and nationalism into the equation of war in the West, and the ferocity of that combination goes a long way toward explaining the 25 years of war that followed (the French Revolutionary and Napoleonic Wars) as well as the thirty-year German war of 1914–45. Faced with foreign invasion brought on by their own ill-considered policies, the political leaders of 1789 declared a *leveé en masse,* which placed citizens and their goods at the disposal of the state for the duration. The result was that the French tripled their army in less than a year and, although they remained less effective in battle than their opponents on a unit to unit basis, they could accept casualties and fight on a scale like no other 18th century military formation. As Clausewitz noted:

Suddenly war again became the business of the people—a people of thirty millions, all of whom considered themselves to be citizens. . . . The people became a participant in war; instead of governments and armies as heretofore, the full weight of the nation was thrown into the balance. The resources and efforts now available for use surpassed all conventional limits; nothing now impeded the vigor with which war could be waged, and consequently the opponents of France faced the utmost peril.[5]

U.S. Army Military History Institute

The American front, November 18, 1918.

It was not until adversaries were willing to fight on the same terms, namely the national mobilization of resources and manpower, that France was finally brought to heel. But its revolutionary example would be replicated by combatants in the American Civil War and later in the fierce killing contests of the two world wars in this century. As suggested above, the French Revolution would find an echo in far off Indochina in the wars waged against the French and later the Americans.

Concurrent with the French Revolution, the first stages of the industrial revolution were already underway in Britain. That upheaval changed the entire economic underpinning of British society and placed unimagined wealth in the hands of political leaders. The industrial revolution did *not* provide the military with technological improvements that helped its soldiers on the battlefield; if anything the British army fought in a retrogressive fashion compared to the French. But while the revolution had little influence on the battlefields of the Napoleonic wars, it provided British governments with enormous financial resources to cobble together and support the military coalitions that eventually defeated Napoleon.

The industrial revolution first influenced the battlefield during the Crimean War, when the rifled musket, telegraph, and steamship combined to allow Britain and France to deploy forces and win against superior Russian numbers. But neither side was willing to seriously mobilize national passions, manpower, and resources. It was left to the opposing sides during the Civil War in the United States, South as well as North, to combine the "benefits" of technology (the railroad, steamboat, rifled musket and artillery, and telegraph) with the French Revolution's mobilization of the populace and national wealth. The result was a terrible killing war of four years which owed its duration to a combination of the three "military revolutions" that had occurred up to that time: the strength of the nation-state, its ability to mobilize society, and the enormous resources and new weapons of the industrial revolution.

In many ways World War I reaffirmed the lethal combination of these revolutions. But in its own way that conflict was a profoundly revolutionary event that fundamentally shattered the Western equilibrium with immense political, economic, and social consequences. The political consequences of the war itself, one could argue, did not end until the autumn of 1989. But of all military revolutions, World War I should be regarded as the most revolutionary in military terms. It involved creating combined arms, exploitation tactics, strategic bombing, unrestricted submarine warfare, carrier operations, and even amphibious war. Admittedly, in some aspects the weapons, technology, and tactical concepts provided only a glimpse into the future, but the glimpse was there nevertheless. Perhaps the best way to illustrate this point is to suggest that a British or German battalion commander from the battlefields of summer 1918 would have understood the underlying concepts of the battlefields of 1940, 1944, and even 1991. A battalion commander of 1914, however, would not have had the slightest clue as to what was occurring in 1918: that was how far military affairs travelled in the course of four years.

RMAs

What then are military professionals to make of these great revolutions that have rocked the history of the West and the world since the 17th century? Probably not much. At best, if they are able to recognize such events, they can hold on and adapt to trying and difficult times. History does

suggest smaller phenomena that might best be termed RMAs. In these cases there is profound evidence that the right military institution and culture can gain a significant advantage.

If military revolutions are compared with earthquakes, we can think of RMAs as pre- and aftershocks. During the process of developing RMAs military organizations must come to grips with fundamental changes in the political, social, and military landscape; they innovate and adapt to—in some cases foreshadow—revolutionary changes. RMAs involve putting together the complex pieces of tactical, societal, political, organizational, or even technological changes in new conceptual approaches to war. The formula is rarely apparent at the time, and even historians with access to the documentary evidence find it hard to reconstruct the full concept. The results on the battlefield, however, make it chillingly clear which military organization has done better at innovating and adapting. Before proceeding we might want to look at where possible RMAs fit with the larger phenomena of military revolutions (see figure 2).

RMAs take considerable time to develop even in wartime

There are several historically interesting aspects of RMAs. First, most take considerable time to develop even in wartime; and peacetime RMAs even in the 20th century have taken decades. One can argue over the accuracy of applying the term *revolutionary* to concepts and capabilities that take such a long time to emerge. There is also the matter of perspective. To the French and British what happened on the Meuse in summer 1940 and afterwards undoubtedly appeared revolutionary. To the Germans the doctrine and capabilities that destroyed the Allies in the battle of France would have appeared revolutionary. Moreover, what is clear today was not apparent to those who fought then. For example, many German officers in May 1940 would have attributed their success to the fanaticism that Nazi ideology had infused into the fighting spirits of their troops. And there would have been some legitimacy to that view, given German perseverance in crossing the Meuse despite casualty figures in lead companies that reached upwards of 70 percent.

Originating an RMA in wartime is difficult enough. The combined arms revolution during World War I, which saw development of accurate indirect artillery fire with decentralized infantry tactics that relied on fire, maneuver, and exploitation, emerged from the slaughter on the Western Front in 1917 after three long years of learning. And the details of that revolution were not entirely clear when the war was over, as the fate of the British and French in the interwar years underscores. In fairness to the World War I institutions that grappled with systemic and intractable problems in an atmosphere of fear, confusion, and ambiguity, it was not until the 1980s that historians began to unravel what actually took place on the battlefield between 1914 and 1918.

If the problems of adapting to wartime conditions are difficult, those involved in peacetime innovation are a nightmare. Michael Howard has compared the military in peacetime to a surgeon preparing for a series of operations at an unknown time and place under unidentified conditions without the benefit of having previously worked on live patients.[6] Rather, he must rely entirely on what he has read and on incomplete and inaccurate models. Similarly, military organizations are called on to function in the most trying circumstances, which simply cannot be replicated in peace. And they frequently have limited resources to prepare and train. Yet the record, as demonstrated by the German campaign against Western Europe in 1940, suggests that some militaries have done better than others. The results of that were equivalent to what most would agree represents an RMA.

Here history contributes to thinking about what kinds of military institutions and cultures the

Figure 2. Military Revolutions and RMAs

Preshock RMAs: *longbow, Edward III's strategy, gunpowder, fortress architecture*

Military Revolution: *17th century creation of the modern state*

Direct- and Aftershocks: *Dutch and Swedish tactical reforms, French tactical and organizational reforms, naval revolution, Britain's financial revolution*

Preshock RMAs: *French military reforms (post Seven Years' War)*

Military Revolutions: *French and industrial revolutions*

Direct- and Aftershocks: *national economic and political mobilization, Napoleonic way of war, financial and economic power based on industrialized power, technological revolution of war (railroads, rifles, and steamboats)*

Preshock RMAs: *Fisher Revolution (1905–14)*

Military Revolution: *World War I*

Direct- and Aftershocks: *combined arms,* Blitzkrieg, *strategic bombing, carrier warfare, unrestricted submarine warfare, amphibious warfare, intelligence, information warfare (1940–45), stealth*

U.S. Navy

Omaha Beach, June 6, 1944.

United States needs to prepare for the next RMA. Historians tend to argue that military organizations are focused on the last war and thus have substantial problems with the next conflict; for example, the traditional image of a revolutionary German army jumping into the future with its *Blitzkrieg* tactics while the British and French, still locked in World War I, failed miserably.

Nothing is farther from the truth. Almost immediately after World War I, the *Reichsheer*, under its first chief of staff and second commander, General Hans von Seeckt, organized no fewer than 57 committees to study what really happened on the battlefield of 1918 in excruciating detail. He charged those examiners to produce:

short, concise studies on the newly gained experiences of the war and consider the following points: What situations arose in the war that had not been considered before? How effective were our prewar views in dealing with the above situations? What new guidelines have been developed from the use of new weaponry in the war? Which new problems put forward by the war have not yet found a solution?[7]

The crucial point is, as Seeckt's last question emphasizes, that the Germans used a thorough review of recent military events as a point of departure for thinking about future war.

Moreover, the spirit of this examination depended on an attitude that Ludendorff expressed in his memoirs about visits to the front: "[Staffs] knew I wanted to hear their real views and have a clear idea of the true situation, not a favorable report made to order."[8] The result was that German doctrine, first crystallized in 1923 and then reworked by Generals Werner von Fritsch and Ludwig Beck in 1932 shortly before they took over direction of the army as commander in chief and chief of staff respectively, reflected actual conditions on the battlefield of 1918. Germany then built on that experience in a coherent, careful, and evolutionary fashion. There was nothing revolutionary about German armored tactics; they fit within a larger conceptual framework of combined arms that rested on exploitation, decentralized decisionmaking, and fire and maneuver—that is, the battlefield of 1918. This process of rigorously examining the past carried over into the German evaluation of current exercises and training.

The French army took no such approach. The examination of the recent past was used to justify current doctrinal trends. In other words, they knew the answer before they started looking. The British case was even more depressing. It was not until 1932 that the chief of the Imperial General Staff, Field Marshal Lord George Francis Milne, saw fit to establish a committee to study lessons of the previous war. Admittedly the committee was given wide latitude: it would examine World War I and determine if its lessons were being adequately addressed in manuals and training. Unfortunately its report was submitted to the next chief, Field Marshal Archibald Montgomery-Massingberd, and the whole effort was deep-sixed since its critical review of army performance in 1914–18 might have made that service look bad. If the British did not get the revolution in armored and mechanized warfare right, critics like J.F.C. Fuller and Basil Liddell Hart were further off the mark. In fact, much of British failure on the battlefields of 1941–42 in North Africa was due to slavish reading of Fuller's argument that armor operated best on its own. Yet there is another point regarding RMA in land warfare during the early 1940s. Starkly put, recent research has stressed that the French army did a miserable job in training its soldiers to face the great test in 1940. Had its units on the Meuse followed doctrine there is a good chance that the German infantry crossings on May 13 would have failed.

If various military organizations misused or misinterpreted history in the interwar period, others completely rejected its relevance to the problems of the day. The Royal Air Force repudiated history entirely and its leaders argued that technology had rendered the past irrelevant.

DOD

Airborne ambulance, Vietnam.

Rather than study air operations in World War I, one could leap into the future to base doctrine, force structure, and employment concepts entirely on theoretical conceptions of what war should look like. Such an approach had a crucial and detrimental impact on the British strategic bombing campaign during much of World War II. One can argue that the lessons of World War I were not entirely clear with respect to strategic bombing and its effects on an enemy nation. Two things were clear, however, from the aerial combat of 1914–18.

First, such air operations required air superiority. Absent that, bombers and reconnaissance aircraft suffered unacceptable losses. Second, finding and hitting targets under anything other than perfect daylight conditions posed intractable challenges. As one naval officer noted of escapades during World War I night operations,

. . . experience has shown that it is quite easy for five squadrons to set out to bomb a particular target and for only one of those five ever to reach the objectives; while the other four, in the honest belief that they have done so, have bombed four different villages which bore little if any resemblance to the one they desired to attack.[9]

Such lessons disappeared from the organizational memory of the Royal Air Force.

The result of the unwillingness to learn from the past was that the British went into the war with almost a religious belief in the survivability of bombers and that finding and destroying targets, if a problem at all, would not be difficult to solve. Such belief in the irrelevance of the past became unwillingness to learn from the present. There were plenty of warnings in terms of exercises that suggested that the Royal Air Force was going to have a hard if not impossible time identifying and hitting targets at night or in bad weather. In turn, the confidence that bombers would always get through led British senior officers to go so far as to suggest that long-range escort fighters were technologically infeasible. They made this argument early in World War II with no technological or scientific evidence to support it. What occurred was a process by which their mental jump into the future without reference to the past caused them to minimize technological possibilities because those possibilities did not fit into their preconceived notion of the future.

American airmen did not fare much better. At least Billy Mitchell, despite the stridency of his arguments, recognized the underlying lesson of the air war in World War I: air superiority was required before airpower could be effectively employed. But by the early 1930s, airmen at the Air Corps Tactical School had discarded such realism and blithely argued that great formations of self defending bombers could fly deep into an enemy nation without the protection of long-range escort fighters and only sustain acceptable casualties. The proclivity to disregard the past as well as the present—that is, a general disregard for an evidentiary-based approach to the preparation of military forces—carried over to the war in the case of both forces. And they continued to execute their operational and tactical frameworks well into 1943 despite unequivocal evidence of problems in their assumptions and thus the results. In the end, the combined bomber offensive played a crucial role in World War II, and we should consider its achievements when arguing that strategic bombing was

an RMA. The cost in aircraft and crews, however, suggests an unacceptable price that was largely the result of too many airmen accepting assumptions that past as well as present evidence suggested were substantially flawed.

The point is not to belittle the airmen of the interwar period. In fact this century is replete with military organizations that preferred to impose their peculiar models of war on conditions they confronted rather than learn from the past. To some extent all organizations will get certain things wrong about the next war; it has been the persistence of many military organizations to hold their course *despite* evidence to the contrary that is inexcusable. The two most obvious cases are the British army during World War I and the American military in Vietnam.

all organizations will get certain things wrong about the next war

How should we adjust to the next RMA? First, no revolution has ever involved a leap into the future without a lifeline to past military concepts and capabilities—particularly the recent past. We should not think that back to the future suggests anything other than a stab in the dark. Those military organizations that have created successful RMAs have tied development of the revolutions to a realistic understanding of the past. That attention to lessons learned has generally been carried over into an evidentiary-based analysis of current exercises and capabilities in peacetime as well as in war. This is not to say that organizations that have failed to use such an approach have failed to adapt to the conditions of a new RMA. The British army during World War I and the combined bomber offensive suggest that, given enough blood and treasure, even the most obdurate military organization will eventually learn, but that hardly suggests a path we should wish to retrace.

Secondly, we must not believe that new concepts or capabilities will negate the fundamental nature of war. Friction together with fog, ambiguity, chance, and uncertainty will dominate future battlefields as it has in the past. History certainly stresses that lesson, and for those who debunk history it is worth noting that various sciences—evolutionary biology, quantum physics, and most current mathematical research—emphasize that Clausewitz's basic understanding of how the world works was correct. Friction will not disappear in the next century; it is a fact of life.

Finally, although technology is important it is only a tool. If we connect it to a clear understanding of the past and present, we can perhaps push our current capabilities into the future in an intelligent fashion and thus be on the leading edge of the next RMA. If we jettison history by haphazardly leaping into an uncertain future, we may endure the same consequences as the airmen of World War II. In 1942 America had almost unlimited resources and the will to "pay almost any price and to bear any burden." Those conditions may well not obtain in the future. **JFQ**

NOTES

[1] The author acknowledges the participation of Cliff Rogers, Geoffrey Parker, John Lynn, Macgregor Knox, Dennis Schowalter, Holger Herwig, Jonathan Bailey, and Allan R. Millett at the RMA conference which was held at Quantico, Virginia, in April 1996.

[2] See among others the introduction by William A. Owens to *Dominant Battlespace Knowledge: The Winning Edge,* edited by Stuart E. Johnson and Martin C. Libicki (Washington: National Defense University Press, 1995), pp. 3–17.

[3] For the development of German armor doctrine, see Williamson Murray, "Innovation in Armored War, " in *Military Innovation in the Interwar Period,* edited by Williamson Murray and Allan R. Millett (Cambridge: Cambridge University Press, 1996).

[4] The following line of argument owes much to the historians who met at Quantico in April 1996, in particular Clifford Rogers and Holger Herwig.

[5] Carl von Clausewitz, *On War,* edited and translated by Michael Howard and Peter Paret (Princeton, N.J.: Princeton University Press, 1976), p. 592.

[6] Michael Howard, "The Use and Abuse of Military History," *Journal of the Royal United Service Institution,* vol. 107, no. 625 (February 1962) pp. 4–10.

[7] James S. Corum, *The Roots of Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence, Kans.: University Press of Kansas, 1992), p. 37.

[8] Erich von Ludendorff, *Ludendorff's Own Story, August 1914–November 1918,* vol. 1 (New York: Harper and Brothers, 1919), p. 24.

[9] Quoted by Group Captain R.A. Mason in "The British Dimension," *Airpower and Warfare,* edited by Alfred F. Hurley and Robert C. Erhard (Washington: Government Printing Office, 1979), p. 32.

Admiral Arthur William Radford, U.S. Navy

(1896–1973)

Commander in Chief, Pacific Command
Chairman, Joint Chiefs of Staff

VITA

Born in Chicago, Illinois. Graduated from the U.S. Naval Academy (1916). Served on board the battleship *USS South Carolina* (1916). Completed flight training (1921). Assigned to the fleet, at naval air stations, and in the Bureau of Aeronautics. Appointed chief of aviation training (1941). Commanded carrier division eleven in the Pacific (1943). Served at the Navy Department (1944). Commanded carrier division six (1944). Became the Vice Chief of Naval Operations (1948) and the Commander in Chief, Pacific/High Commissioner, Trust Territory of Pacific Islands (1949). Appointed Chairman of the Joint Chiefs of Staff (1953). Involved in the so-called "revolt of the admirals"; as Chairman supported President Eisenhower's "new look" policy and also dealt with the Formosa and Suez crises. Retired in 1957 and remained active in national security affairs, often being called upon for advice by the White House. Died at Bethesda Naval Medical Center.

U.S. Navy

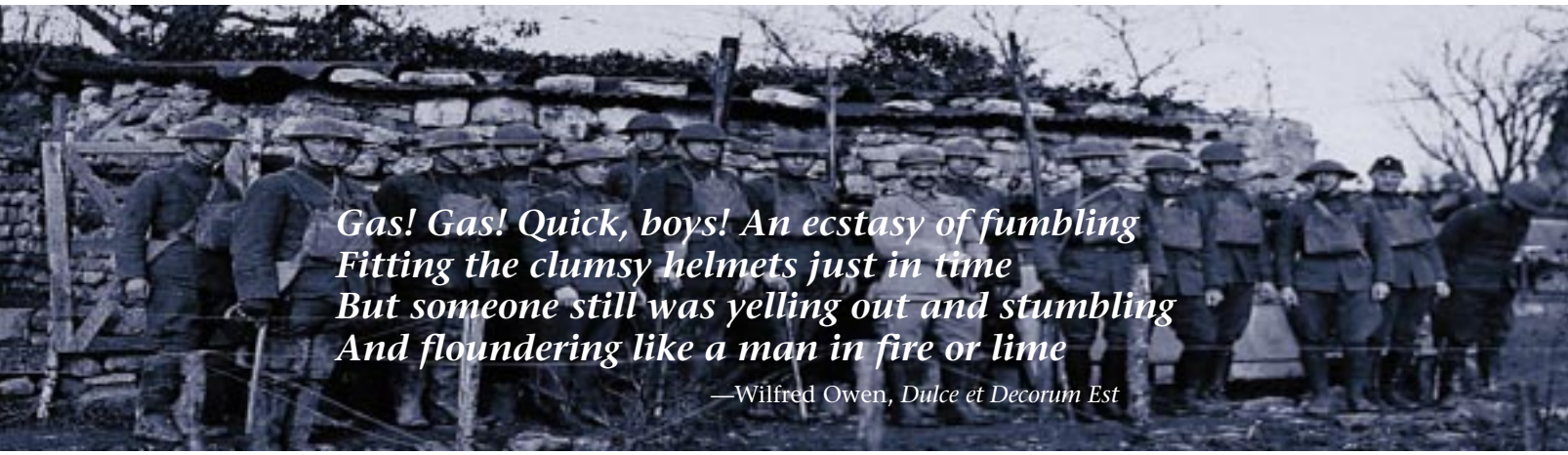
On arrival in Washington, I wasted no time in reporting to . . . Secretary [of the Navy Forrestal]. He said something like this:

"Radford, I have become increasingly concerned with the situation in regard to the merger fight or unification of the services. . . . I have, therefore, had you ordered back to take charge of the Navy's efforts to insure, if at all possible, that legislation on this subject, which is sure to be passed in the not-too-distant future, is satisfactory from our standpoint. My personal position is that an improved and unified defense organization is needed. The President wants one quickly, and the Army is pushing for speedy action with his complete backing. You are to set up an office, under me, and go to work as soon as you can."

By 1946 I had a broad knowledge of the problems of the services. In my new job I tried to establish and define my own position. I concluded that:

- **There was no doubt that the services could not return to the earlier status quo, two separate and independent Departments of War and Navy.**
- **Any new organization must attempt to coordinate military with national planning in political and economic fields.**
- **A "joint chiefs of staff" organization, similar to the one that had worked so well under President Roosevelt in World War II, must become a statutory body.**

—From *Pearl Harbor to Vietnam: The Memoirs of Admiral Arthur W. Radford*



U.S. Army Military History Institute

An Ecstasy of Fumbling: Doctrine and Innovation

By KENNETH F. McKENZIE, JR.

The information explosion is beginning to influence that most conservative of institutions, the Armed Forces. Professional journals from *Parameters* to *Proceedings* are awash with articles on RMA and military technical revolution (MTR).[1] Depending on their technological or ideological bent, these articles either hail new developments as a shining path to the future or gloomily decry the shortcomings, both real and perceived, of emerging concepts and hardware. Thus it is difficult to tell if we are entering an era in which perfect knowledge—that is, information dominance—will be coupled to perfect strike capabilities or if we are about to field complex systems that will deluge users under mountains of trivial data attached to easily thwarted strike technologies. What we can be sure of is that we are on the verge of an explosion in ideas as well as systems that promises to change the way war is fought. In fact, RMA is nothing more than the military application of ideas from a global revolution in technology brought about by advanced computerization techniques.

Two Cultures

Technological innovation is unruly, spasmodic, and to a certain extent uncontrollable—the opposite of developing force structure and doctrine which tends to be highly predictable, cautious, and self-regulating. To effectively link doctrine and technology one must combine the dynamism of scientific inquiry and the caution of military culture (see figure 1). This is not a condemnation of the military mind. Soldiers are innately cautious because the stakes in their profession are high. The outcome of war is critical to national survival. Success or failure is measured in human lives.

Operational doctrine and organizations must be flexible enough to embrace new capabilities that arise from research and applications far removed from military requirements. Taking practical battlefield advantage of new ideas is the responsibility of doctrine. To do this, the military culture must be prepared to leap forward with technology and establish meaningful paradigms for practical soldiers from technological starting points that may appear unreachable at first. At the same time, the culture must be discerning enough to reject irrelevant or unnecessary capabilities. This is a tall order for cautious minds forced to deal with explosive opportunities, but the alternative is disaster. An inability to accommodate ideas or, more likely, a tendency to misapply concepts will be paid for in opportunities lost in combat.

Major Kenneth F. McKenzie, Jr., USMC, is executive officer of the 1st Battalion, 6th Marines, 2d Marine Division, and previously was assigned to Headquarters, U.S. Marine Corps.

The interaction between emerging technologies (together with the weapons and capabilities that ensue) and doctrine—the way land, sea, and air forces fight—will be the fundamental dynamic in determining whether new ideas are digested and used properly. In short the question is whether we can translate technological concepts into battlefield advantage.[2] That is a crucial step, because technological advances, regardless of their inherent brilliance, must be harnessed to a coherent model to be employed for decisive advantage. New technologies must be integrated with tactical organization, techniques, and procedures. This is easy to understand but difficult to accomplish. It requires managed, directed interaction of scientific and industrial methods with a military culture that must deal with the realities of the battlefield. These two worlds may be far apart, but they can eventually be merged. Avoiding an "ecstasy of fumbling" over integration can provide the margin of victory over an opponent who is struggling with the same problems.

Figure 1. The Scientific and Military Worlds

Scientific Culture	Military Culture
Driven by discovery; non-hierarchical	Driven by knowledge; hierarchical
Embraces the unknown	Avoids the unknown
Externally directed	Internally directed
Long term orientation	Short term orientation
Outcomes are secondary	Outcomes are paramount

translating potential into functional purpose dictates the pace of organizational and doctrinal integration

Chicken or Egg?

Requirements may be driven from the bottom up based on combat imperatives, or from the top down based on a concept for employment. Ideally, requirements are identified, then directed technological advances provide capabilities to answer the need. This almost never happens—and in an era of exploding ideas, requirements are vastly outpaced by burgeoning technical capabilities. This means that many ideas emerge from a growing external base, offering exponential advances increasingly dislocated from a conservative internal approach to requirements. In some cases this means that the requirements system is being wrung inside out. We are examining the relevance and utility of advanced systems and technologies that we have not requested and that have not been validated by any concept-based demand, which is uncomfortable and inevitable. Increasingly, the origin of a capability will become less important. The only criterion will be its advantage in battle.

New ideas and technologies introduce potentialities, some self-generated, others externally created. Cumulatively, they shape the expectations for the new idea. What is this thing supposed to do? How can we measure its success? Some expectations, such as the Manhattan Project, are obvious, others less so. Translating potential into functional purpose, articulating an end state, can destroy a project before it reaches fruition, regardless of technical feasibility. Expectations can be set too high or low. Either extreme is counterproductive. The ability to determine a reasonable and attainable end state for new technology dictates the pace of organizational and doctrinal integration. This can be difficult, because relationships of this nature are neither linear nor static. Instead, the interactions are dynamic—expectations change as technologies mature. At the same time, existing doctrine and organizational patterns are not frozen. They, too, are responding to external stimuli.

The development of the XB–70 as a high-altitude supersonic penetrating bomber in the late 1950s is a case in point. Despite technical feasibility that was demonstrated, the improvement in Soviet air defenses forced a shift in Air Force strategic bombing doctrine, away from high altitude to a low-level approach. Doctrine changed as the technology arrived. Many other examples come to mind. Royal Navy battlecruisers during World War I were designed and built for a high-speed scouting role, yet they were eventually forced to lie in the line of battle, largely because they looked like battleships—which had disastrous results at Jutland. The process of melding technologies and doctrine is difficult because both are "moving targets."

When new technology only modifies an existing paradigm for the conduct of war, it can be readily subsumed and digested. It may also be misapplied. The disastrous fielding by the French of the *Mitrailleuse* in 1870 is an example (this early machine gun was employed as an indirect fire weapon and kept so secret that its users were unfamiliar with its capabilities). Conversely, some technologies establish entirely new paradigms—the tank, airplane, and radar, for example (though it should be remembered that the tank was initially misused as a pillbox, the airplane as a horse that flew, and radar as a pair of binoculars). The creation of revolutionary new paradigms like these is relatively rare. Most new technologies only modify existing methods, although even incremental modifications eventually may greatly change an operational paradigm.

Germany and Chemical Warfare

The German attempt to integrate the technology of gases in World War I is a telling case of the difficulties in harnessing technology to military purposes. No clear requirement generated the capabilities inherent in gas; instead

chemical assets emerged almost without regard to requirements. Gas warfare began as a technological initiative of the German chemical industry. It is the story of the translation of an experimental concept into integrated doctrinal and organizational acceptance. The final adoption was ultimately expressed in approved tactics, techniques, and procedures, all part of a coherent doctrine for employment. The cost of achieving this integration was time—time lost that could never be recovered.

German experience with offensive chemical warfare is particularly relevant today because it clearly illustrates the difficulty of integrating developing technology and existing doctrine. In many ways, it parallels the broad yet second-order technology of information management as related to the battlefield. Unlike the tank or airplane, gas was not developed as an independent weapon. It did not alter the paradigm of ground combat in World War I. Instead its effects were distributively felt and essentially supportive. By 1918 these effects were evident across all aspects of German tactical doctrine, but as an enabling force rather than a centerpiece. This makes the study of these German attempts to integrate gas useful in examining new technologies today that must be linked to doctrine and organizational architecture not only directly, but more often indirectly.

Strategic Framework

Like most wartime marriages of technology and tactics, German gas warfare was driven by military necessity. By late 1914 it was clear that the great maneuver battles on the Western Front at the beginning of World War I had not been decisive. Out of broken plans came the establishment of static positions which yielded slowly but inevitably to trench warfare. This reflected a strategic stalemate that characterized the conflict until 1918. Strategic mobility, made possible by railroads and theater logistics, enabled both sides to shift reserves to prevent local successes from becoming breakthroughs. At the same time, on the tactical level, fire dominated the battlefield. The limited offensive tactical mobility of foot-mobile infantry, horse-drawn artillery, and primitive battlefield logistics systems could not overcome the defensive supremacy of fire. It was virtually impossible to generate opportunities for operational maneuver beyond the depth of enemy trenches before the latter could redeploy sufficient forces to reestablish his defenses.

The Germans endeavored to break this static front on both the strategic and tactical levels. The strategic recourse included the ill-fated 1916 Verdun offensive, an attempt to bleed the French army to death that inexorably bled both armies white. After this, the correlation of forces drove the Germans to the strategic defensive. Thus, they developed a doctrine of elastic defense in depth, designed to minimize Allied artillery superiority. In 1917 victory over the Russians allowed them once again to shift their forces westward where they could attempt to achieve a decision before the weight of American arms could be brought to bear.

Ypres

In the winter of 1914 the Germans experimented with gas in two small-scale attacks, but it did not affect enemy troops. In October 1914, at Neuve Chapelle in France, tear gas (dianiside chlorosulphate) was delivered by primitive artillery projectiles.[3] In January 1915, at Bomilov in Russia, artillery-delivered xylil bromide was used, but an attack designed to take advantage of the presumed effect of gas was a costly failure. Extreme cold weather dissipated the effects of the gas. Problems were encountered in matching gas projectiles with high explosive shells.[4] Despite these setbacks German scientists and soldiers remained interested in gas. Certainly the Allied newspaper articles claiming new and ominous French gases were a spur to German chemical enthusiasts.

Fritz Haber of the Kaiser Wilhelm Institute for Physical Chemistry in Berlin observed these failures and offered an alternative gas and delivery means. He proposed using chlorine, a lethally toxic gas to be delivered by cloud. Large quantities of commercial chlorine were readily available. Gas cylinders would be transported to the trenches and opened. Favorable winds would move the cloud over no man's land to Allied trenches. With enough cylinders, a lethal concentration could be achieved. Because the gas dispersed rapidly, an exploiting infantry attack would not be slowed. Expectations were relatively low. Scientists saw gas as simply a casualty producer. Concurrently, it might reduce the demand for high explosive projectiles. For German war planners, a shortage of helium

French 340mm (13.9 inch) gun.

(HE) was a real possibility. No operational requirement had been set forth for gas.

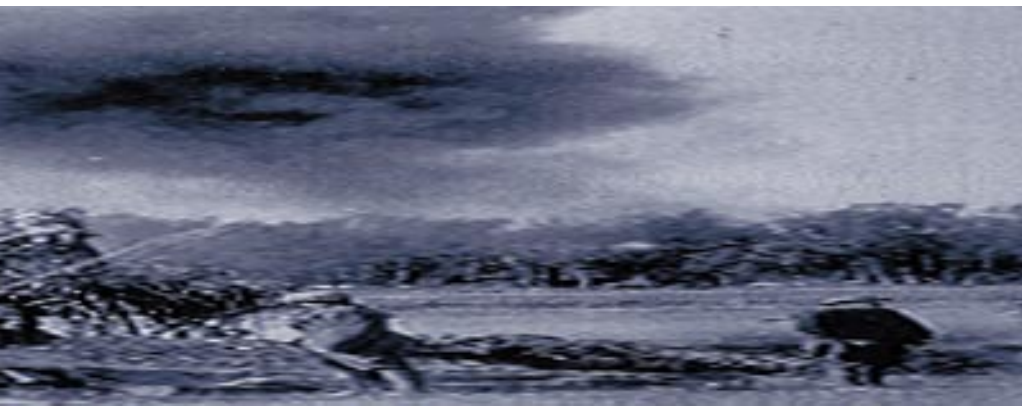
General Erich von Falkenhayn, chief of staff and de facto supreme commander, took Haber up on his offer. He decided to employ gas on the Western Front as part of a limited attack at Ypres that did not heighten expectations for using gas. Ypres would test gas as an offensive weapon and cover redeployment to the eastern theater, where the main effort for 1915 was planned. The failure of earlier chemical experiments was duly noted. There was no attempt to consider exactly how gas might change the tactical balance of power.

Duke Albrecht's Fourth Army had emplaced over 5,700 large and small chlorine cylinders. Two infantry corps were prepared to follow the cloud this would generate, overrunning the Allied positions. But a complication arose. The prevailing winds were from west to east, which was bad both in the long and short term for German gas cloud operations. The Fourth Army waited over a month before the weather was adequate. To planners, the Western Front had become a supporting action. Falkenhayn's attention had swung east to Galicia. Thus, on April 10, 1915, Falkenhayn made it clear to General Ilse, chief of staff of Fourth Army, that it was "more important to launch the gas cloud as soon as possible than it was to obtain a deep penetration." As if to emphasize his point, Falkenhayn refused the Fourth Army request for an additional division to exploit possible success and also turned down requisitions for supplementary artillery ammunition.[5]

Once started, late in the afternoon of April 22, 1915, things went better than even the most sanguine gas enthusiast could have hoped. The brunt of the attack was borne by Algerian troops who broke and ran. A gap of some four miles appeared in Allied lines. Thirty minutes after the gas discharge, German troops advanced four and a half miles until encountering a rag-tag cordon of Canadians. The assaulting infantry, tired and perhaps having lost their edge in the month-long wait for proper winds, could not break the line. There were no German reserves to throw in, so the momentary gap disappeared.

gas seemed to slow the advance of the attackers almost as much as the fire of the defenders

Subsequent gas attacks over the next 48 hours were unfruitful, although they caused over 5,900 Allied casualties, a ratio of over two Allied soldiers to each German.[6] In the context of most engagements, this was a heartening statistic for the Germans.



U.S. Army Military History Institute

Interestingly, the gas seemed to slow the advance and depress the ardor of the attackers, who feared its unknown effects almost as much as the fire of the defenders.[7] There were positive technical and tactical aspects of Ypres. The ratio of casualties was favorable, and a gap opened in the French lines. Unfortunately, there was no plan for taking advantage of the penetration, and while one can criticize the Germans for wasting an opportunity in an insignificant localized operation, this is hindsight. All the Germans expected of gas was that it would produce casualties. Gas had been effective against unprepared forces, but such surprise could be achieved only once. The success of Ypres was not exploited, so thus it was irrelevant and meaningless. The shock effect of the new technology was not matched by tactics for a fleeting opportunity. Even if the Fourth Army had been better prepared to continue the attack, given the limitations of artillery mobility and logistics, it is difficult to believe that it could have been translated into an operational success.

Chemical warfare was primitive and unable to produce the ideal gas for maneuver support, one of high toxicity but not persistent. Such developments (nerve agents) rested in the future. The gas used by the Germans, particularly when limited to cloud attacks, could produce casualties but were too blunt to shape the battlefield decisively. Their net effect was simply to add more friction to a situation that was already frightful enough. Gas was a two-edged sword that worked against attackers as well as defenders, and it was not lethal enough to be used as an independent bludgeon. Without maneuver, it could not produce enough attrition to alter the balance of power. The basic problem, which would haunt the Germans for three years, was the relation of gas to maneuver.

Failure to Integrate

Over the next two years, the Germans used various gases and delivery systems against the Russians and Italians and on the Western Front. Results were generally favorable but not decisive. One problem with gas attacks was the lack of reliable means for assessing results which plagued the Germans throughout the war. Professor Haber was placed in charge of the German chemical warfare effort. Eventually, he served as the link among science, industry, and the high command. It was not


Meuse-Argonne, 1918.

an altogether successful linkage. The military distrusted scientists to some degree, but a reasonable amount of cooperation was achieved by Haber. The Germans consciously decided to make their effort self-contained "on account of the special nature of the work, the need for secrecy, and the desirability of avoiding any delay with a weapon that was developing so rapidly."[8] The industrial production of gases and delivery systems was generally adequate. Over time, the problem became less one of scientific research and industrial manufacture than tactical application. The gases could be produced; but what were they supposed to do?

The introduction of phosgene, a more potent agent, was accompanied by improved artillery and projectiles as the principle delivery technique for German chemical weapons. Artillery added depth to gas, making it less reliant upon weather. Diphosgene (green cross) gave German gunners a potent, in-depth offensive chemical capability. By mid-1915 German offensive chemical thought began to embrace a concept which has become basic to chemical warfare: the division of offensive chemical weapons into persistent and nonpersistent agents. The recognition of this duality started the interpretation of chemical warfare technology and conventional artillery tactics. With this came a heightened set of expectations for chemical weapons. They could perhaps do more than create deadly friction and fear in friend and foe alike. This blunt, deadly weapon could be sharpened.

With this technical interpenetration, artillerymen began to apportion chemical targets in two categories. Targets attacked by infantry received nonpersistent agents, and those attacked by fire only, suppressed, or denied, received persistent agents. This split was, and remains today, a pillar of offensive chemical warfare doctrine.[9] For the Germans it began—but only began—to provide the structure for a coherent application of chemical weapons. Despite these technical advances, it was clear that offensive chemical warfare alone would not break the tactical stalemate in the West. The opportunity proffered at Ypres, combining German surprise and Allied unpreparedness, defied replication. In fact, if the machine gun was the essence of infantry, then gas remained the essence of attrition. It simply added to the coefficient of friction on a battlefield already overwhelmed with obstacles to maneuver and casualty-producing systems. Because it proved difficult to link gas to maneuver, by late 1915 chemical operations had become dislocated from offensive maneuver.

The goal of German chemical attacks had nothing to do with attempts at a breakthrough. Instead they sought simple attrition. The nadir of this offensive chemical employment was typified at Verdun in 1916 where massive amounts of diphosgene were fired on French artillery positions in barrage operations which were not linked to ground maneuver to take advantage of success.[10] Despite the development of a technical architecture for targeting, a broad doctrine and a vision for operational integration were lacking. From 1915 to autumn 1917, the German chemical warfare effort, regardless of how relatively advanced it was, would be without a framework for employment. This diffusion of purpose prevented gas from being used in an integrated combined arms effort.

Figure 2. German Chemical Warfare Development, 1914–18

Time	Illustrative Battles	Expectations	Effects	Doctrine
1914–15	Bomilov, Nueve Chapel, Ypres	none	mixed	none
1915–17	Verdun	low	indecisive, attritive	technical only, not linked to maneuver
1917	Riga, Caporetto	moderate	successful, attritive	informal technical and operational; linked to maneuver
1918	Michael	high	very successful	formal technical and operational; linked to maneuver

U.S. Army Military History Institute

Changing Expectations

A doctrinal development reflecting organizational and tactical changes brought gas to the fore as a tool to break the tactical deadlock: the introduction of infiltration tactics. These tactics put a premium on short, high-intensity hurricane artillery barrages that gas projectiles could enhance. In October 1917, artillery-delivered chlorine and phosgene were fired against Italian positions on the Isonzo River at Caporetto, coupled with an attack led by infantry trained in infiltration tactics. The Italians were unprepared for both the gas and *Stosstrupen* and were routed.[11] It was one of the most complete successes for gas in the war and served as a model for subsequent attacks in the West. This action, coupled with similar success at Riga in September 1917, were harbingers of an increasing role for gas in German offensive thinking.[12] Another was the German counterattack at Cambrai. In November 1917 a short artillery preparation preceded the infantry infiltration-style attack. A large percentage of the shells were chemical, which disoriented the British defenders as much as caused injury. The use of gas in such cases was aimed at suppression, not destruction, and greatly reduced the time required for the German artillery to achieve effect on target.

The Germans developed a vision for effective, coherent offensive chemical doctrine in early 1918, when informal procedures of the previous two years were superseded by a comprehensive work released by the high command on January 1, 1918 entitled *The Attack in Position Warfare*. This document set out the German approach to breaking the tactical stalemate of trench warfare. It reflected the lessons of Riga, Caporetto, and Cambrai. Gas was a key element, both because of its "disruptive characteristics" and because it gave artillery greater effectiveness over shorter times.[13] For rapid suppression, gas was far more economical. Excellent suppression, particularly against enemy artillery, could be obtained with far fewer gas than conventional HE shells.

the technological advantage afforded by industry was not matched in doctrine or organizational concepts

In infiltration tactics, speed of attack was critical, and artillery-delivered gas heightened the shock and force of indirect fire without requiring the long preparatory fires typical of both British and French tactics at this period. Toward that end, by the close of the war the basic load of German artillery units was 50 percent gas shells.[14] In certain operations the ratio of gas to conventional rounds fired was three to one. Driven by a slowly awakening doctrine, technological advances were being integrated into organizational practice and tactics. The expectations were shifting, with chemical warfare techniques being integrated into a larger tactical calculus.

An important development was technological, the widespread adoption of mustard gas, or yellow cross. Mustard was lethally toxic and persistent; it could kill up to 72 hours after exposure and acted against skin as well as lungs. In the German Michael offensive of 1918, mustard agent was fired as a barrier to deny the flanks of attacking formations and against targets that were not to be assaulted by infantry. Nonpersistent agents such as chlorine and diphosgene were fired against targets to be carried by the German infantry. It was a sophisticated approach: lachrymatory gases, or throat irritants, were mixed with other gases to force defending infantry to remove their masks, thus rendering them vulnerable to lethal agents. As the 1918 offensives ground themselves out and reached an end, the Germans discovered the utility of mustard agent as a defensive weapon. It proved a highly effective barrier weapon and ultimately was more successful in the defense than in the attack. Had the war remained mobile, mustard agent—available to both sides by 1918—might have served to slow the tempo of the fight yet again by denying vast areas to maneuver forces.[15]

The Lessons

The hinge of history turned at Ypres, but the Germans were unprepared. The technological advantage afforded by industry was not matched in doctrine or organizational concepts. Ironically, initial German conservatism toward gas was sparked by earlier small-scale failures.[16] It would not be until late 1917 that offensive chemical warfare again played a significant combat role. For the Germans, systematic success with offensive chemical warfare finally occurred when it was used in a totally integrated operational concept, when the strengths of gas warfare—suddenness, shock, and variable persistencies—were linked to a broad, thorough tactical scheme: infiltration tactics. This interpenetration of technology and doctrine yielded a coherent framework for employment. Gas was the junior partner in 1918, one of the key supporting tools for infiltration tactics; a means, not an end. In this case, the shifting paradigm of infantry and artillery combat for the Germans absorbed the capabilities provided by gas and gave them useful

expression. Before the linkage of gas to infiltration tactics, chemical warfare was a clumsy, balky killer; after the linkage it became a lethal accomplice.

As shown in the accompanying figure, German offensive chemical warfare ultimately helped to break the tactical deadlock on the Western Front, but the long gap between first use in 1915 and coherent employment in 1918 blunted its contributions. Despite the best of intentions, the Germans were unable to rise above the lure of simple, direct attrition and to effectively link chemical warfare to maneuver until 1918. By then it was too late.

The German experience offers important lessons. The inability to fully exploit offensive chemical capabilities was linked to the dynamic nature of war. New weapons may have enormous shock value but also operate under a principle of rapidly diminishing returns. We must plan for their initial use with maximum effect. If capabilities are either misunderstood or unappreciated, they will be misused—or, as with gas, underused. The chance for decisive action can disappear because the opposition will compensate, often at a fraction of the original cost.

Weapons and technologies which are becoming available today, particularly those related to information management, represent only part of a larger global revolution in technology. On the operational level, we must exploit fleeting advantages that even immature, incomplete technologies offer. This involves recognizing that new ideas may well bring new vulnerabilities. Time is a key consideration in using new technology, for action deferred may be success denied. At the same time, the casual, unconsidered use of immature technology, while locally successful, may prevent a subsequent coordinated application of its ultimate strategic significance. But there is no formula for success. Each opportunity must be weighed against the potential cost. Our goal must be to reduce the period of fumbling, the time in which we try to mesh capabilities with a coherent plan for employment. Success will largely be a function of how quickly we mesh them operationally.

As we enter the next century, the Armed Forces must accommodate significant changes in alliance structures and political direction, and soldiers, sailors, marines, and airmen must consider how best to cope with new weapons and technologies. Not every decision about these weapons and technologies—and, importantly, how we think about them—will have an immediate tactical effect, but as the Germans learned in World War I, an "ecstasy of fumbling" about how to integrate a new idea can cost dearly in both the short and long runs. Thus we should think critically about how ideas have been integrated into military organizations in the past and should not hesitate to apply the lessons to current situations. JFQ

NOTES

[1] Andrew F. Krepinevich, in "Cavalry to Computer: The Pattern of Military Revolutions," *The National Interest*, no. 37 (Fall 1994), p. 30, defines MTR as "what occurs when the application of new technologies into a significant number of military systems combines with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict."

[2] Michael T. Mazarr et al., *The Military Technical Revolution: A Structural Framework* (Washington: Center for Strategic and International Studies, 1993), p. 18.

[3] Charles E. Heller, *Chemical Warfare in World War I: The American Experience, 1917–1918* (Fort Leavenworth, Kans.: Combat Studies Institute, 1984), p. 6.

[4] Guy Hartcup, *The War of Invention: Scientific Development, 1914–1918* (London: Brassey's, 1988), pp. 95–96.

[5] J.L. McWilliams and R.J. Steel, *Gas! The Battle for Ypres, 1915* (St. Catherines, Ont.: Vanwell Publishing Co., 1985), p. 26. See also Basil Liddell Hart, *A History of the World War, 1914–1918* (Boston: Little, Brown and Co., 1935), p. 248.

[6] Heller, *Chemical Warfare*, p. 31.

[7] Liddell Hart, *History*, p. 248.

[8] Hartcup, *War of Invention*, p. 105.

[9] Edward M. Spiers, *Chemical Warfare* (Urbana: University of Illinois Press, 1986), p. 23; Edward M. Spiers, *Chemical Weaponry* (New York: St. Martin's Press, 1989), pp. 26–27.

[10] Ibid.; Bruce I. Gudmundsson, *Stormtroop Tactics: Innovation in the German Army* (New York: Praeger, 1989), pp. 67–68.

[11] Patrick T. Stackpole, "German Tactics in the Michael Offensive, March 1918" (MA thesis, School of Advanced Military Studies, Fort Leavenworth, Kans., 1993), pp. 35–41.

[12] Ibid., pp. 28–34.

[13] T.T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine during the First World War* (Fort Leavenworth, Kans.: U.S. Army Command and General Staff College, 1981), p. 41.

[14] Stackpole, *German Tactics*, pp. 49–53.

[15] Stockholm International Peace Research Institute, *The Problem of Chemical and Biological Warfare: Vol. 1, The Rise of CB Weapons* (Stockholm: SIPRI, 1971), p. 140; Heller, *Chemical Warfare*, pp. 24, 27.

[16] McWilliams and Steel, *Gas*, p. 214.


NORAD/SPACECOM Command Center, Cheyenne Mountain.

U.S. Air Force (Carol Floyd)

War in the Information Age

By THOMAS G. MAHNKEN

The strategic force commander sat in a dimly-lit subterranean command center, waiting for the battle to start. Each of his component commanders was settled in front of a luminescent screen which displayed aspects of an ongoing situation half a world away. Green icons marked positions of enemy command and control nodes as electronic lightning flickered across the displays revealing traffic over networks.

The war had begun three weeks ago when the President approved the infiltration of enemy information networks. Since then information warfare teams had worked hard to compromise enemy command and control systems. They saw themselves as commandos of the information age who moved unnoticed through information networks, searching out and mapping the sinews that bound the enemy together. Some they would destroy; others they would leave alone.

Thousands of miles away, the first strike began exactly at midnight. Fingers of light arced into the dark sky off the enemy coast as semi-submersible arsenal ships launched wave after wave of ballistic missiles. High overhead stealthy aircraft released their deadly payloads, cruise missiles armed with electromagnetic-pulse warheads designed to short-circuit electronic systems. Nearby, a wing of penetrating aircraft carrying precision-guided munitions peeled away and began bombing runs. In space above them, a constellation of small satellites began to de-orbit payloads of heavy-metal rods capable of destroying the hardest targets known to man.

The commander watched the attack take shape from his underground sanctuary. A network of satellites and unmanned air vehicles began to provide the command center with battle damage assessment data as the attack was still underway. The objective of the strike had been to blind the enemy by dismembering his command and control system, and initial reports showed that it had been largely successful. A red stain spread across the situational displays indicating that the initial waves of ordnance had ripped holes in enemy command and control networks. But other nodes remained functional. Here and there other green lights started to flicker, indicating the presence of previously unknown nodes only now coming to life in the wake of the first attack.

The automated battle manager had already evaluated the initial results of the attack and was formulating the next strike. A list of weapon-target pairings appeared on a screen in front of the commander. He deleted several targets, withholding them for later, then sent the list forward to his component commanders for execution. He looked over at his theater force commander, seated at another screen across the room. Only time would tell whether his men would be needed to bring this conflict to a close.

Over the next few decades, the growth of microprocessing and information technology will create a revolution in military affairs (RMA) that transforms the tools, conduct, and eventually the nature of war.[1] The emergence of long-range precision strike and information warfare may usher in an era of conflict based on paralysis and shock rather than attrition. While no panacea, concepts and organizations for waging war in the information age may offer us decisive advantages over a range of regional enemies as well as leverage against a peer competitor, should one emerge.

The development of systems which collect, process, evaluate, and distribute information is already changing the way we plan and conduct military operations. Advances in sensor technology and data processing will allow us to gather and interpret an extraordinary amount of information about our forces, those of prospective enemies, and the battlefield itself. Sensors operating across the electromagnetic spectrum will locate targets as information processors fuse data from disparate sensors into a single coherent picture. They will enable us to understand where force can be decisive as well as offer greater control over its use. Robust command, control, and communications (C^3) systems will help disseminate the resulting information in seconds, while stealthy precision strike systems will attack an enemy discriminately at long range. Advanced guidance technology, including data from global positioning system (GPS) navigation satellites, will let us strike targets with an accuracy of feet from standoff distances. As a result, we may be able to destroy virtually any enemy target that can be identified.

the most far-reaching effect is the ability to integrate a myriad of systems

The most far-reaching effect of the information revolution is the ability to integrate a myriad of systems into what the Vice Chairman, Admiral William Owens, calls a "system of systems."[2] The network's sensors could sweep the battlefield in search of an enemy, with data processing systems fusing sensor inputs into a single coherent picture and disseminating it to units worldwide. Individual weapon systems could use this information to "bid" on targets, much as traders bid on stocks, with an automated battle manager determining optimum weapon-target combinations. Data from space-based sensors might, for example, be used to target aircraft dropping precision-guided munitions, while special operations forces deep behind enemy lines might be called on to identify targets for long-range ballistic or cruise missile strikes. During and after strikes networked sensors would gather, evaluate, and disseminate battle damage assessment (BDA) much more rapidly than has heretofore been possible.[3]

The effectiveness of long-range precision strike systems will be decided by a game of hide-and-seek played by our sensors and enemy targets. If advances in stealth, deception, and mobility outpace the ability of sensors to acquire targets, then long-range precision strike systems will be ineffective. If, on the other hand, information fusion renders the battlefield transparent, long-range precision strikes will be lethal. Where we end up on this continuum will shape the character of war in the information age.

As the ability to gather, fuse, and disseminate information becomes more central to military affairs, information networks may themselves become critical targets. Thus information warfare, by which a state denies or manipulates the intelligence available to an enemy, may permeate all levels of conflict, from sophisticated tactical electronic warfare to strategic attacks against civil and military information infrastructure. Some see the information revolution as the dawning of a new, bloodless age of conflict dominated by "netwar" and nonlethal technologies.[4] More modestly, it is likely to expand the options available to decisionmakers for waging lethal war.

The Dawn of Shock Warfare

The increasing range and accuracy of weapons will enable us to mass extremely lethal fires at will. Rather than closing on an enemy, we may be able to engage and destroy it at long range. Moreover, the advent of information warfare may allow us to disrupt those networks that allow an enemy to act in a coordinated manner. In combination, long-range precision strike and information warfare capabilities may provide the means to focus our strengths against enemy weaknesses and thus crush its will to resist. The result is likely to be a new paradigm of warfare, based not on attrition but on the ability to paralyze and shock. A fundamental tenet of attrition warfare is that victory can be achieved through the progressive destruction of an enemy. In the end, it is the threat of further punishment that causes surrender. Shock warfare, by contrast, compels an enemy to follow the course that we desire by foreclosing options which we deem undesirable.

A campaign combining strategic information attack and long-range precision strike could afford us substantial leverage against a future enemy. The initial phase would seek to disorient or paralyze an enemy by disrupting its decision cycle. This may, in turn, undermine its confidence by creating uncertainty about controlling the course and outcome of a conflict. It may also increase our capacity to surprise an enemy. Strikes on hostile command and control systems, for example, could hamper enemy ability to employ forces effectively by interfering with the leadership's ability to collect, process, and disseminate information.[5]

Should the initial operation prove insufficient to break enemy will, we might destroy its capability to resist by massive, coordinated strikes on a range of key target networks.[6] Leverage could accrue from the ability both to achieve greater battlespace awareness than an

Ensign Thomas G. Mahnken, USNR, is assigned to the Office of Naval Intelligence and is currently a national security fellow in the John M. Olin Institute for Strategic Studies at Harvard University.

enemy and to exploit that advantage by operating faster than an enemy can react.

The effectiveness of such a strategy will depend in part on our ability to collect, assess, disseminate, and exploit information. There is, within reasonable bounds, a relationship between our level of battlespace awareness and the effectiveness of our forces. At a relatively low level of awareness, for example, we may be able to identify discrete targets but unable to understand their relationship. As awareness increases, we may understand how targets form systems and identify key nodes within each system. That may allow us to employ our forces more efficiently.[7]

One way to increase the effectiveness of our forces in war will be to develop a sophisticated understanding of potential enemies in peace. Intelligence to support information warfare and long-range precision strike will, however, be a major challenge.[8] We will need not only to identify individual targets with precision but to understand how they fit into networks. In addition, we must understand which nodes and networks are vulnerabilities.[9] Highly centralized target systems such as national leadership may be vulnerable to a relatively small number of well-placed strikes. By contrast, highly distributed systems such as cellular communication networks might be much more resistant to disruption. Furthermore, we must understand the effect of our strikes upon an enemy's capacity and will to wage war. This will require not only the ability to view an enemy as a coherent system, but insight into its values and strategic culture. One way to improve our understanding of potential enemies might be to constitute multidisciplinary teams of analysts with expertise in intelligence, information systems, targeting, and weapons effects. Such teams could conduct both studies of an enemy's society and culture to determine the most effective ways to shatter its will and in-depth analyses of its target networks to identify vulnerabilities.

Mobile communications terminal.

U.S. Army

Global positioning system.

U.S. Army

decisive outcomes are likely where one side has a marked information advantage

The shape of future warfare will largely depend on achieving an information advantage. One can imagine a situation in which neither side possesses a high battlespace awareness. In such circumstances, neither would be able to conduct decisive operations. Such a battle might resemble a duel between blind swordsmen. A conflict in which both sides enjoy a high level of battlespace awareness might look more like a chess match between grand masters, each maneuvering while waiting for the other to make a mistake. By contrast, decisive outcomes are likely to result from situations where one side enjoys a marked information advantage, as the United States did during the Battle of Midway and the Gulf War.

A future war may thus begin with an information suppression operation aimed at reducing our enemy's battlefield awareness while we protect our own. Achieving information dominance against a peer competitor with distributed and redundant sensor and communication networks is likely to be difficult. Gaining an information advantage will depend on how well we can identify and destroy the key nodes of an enemy's information infrastructure. The level of success required of such an operation will, however, depend on our overall objectives. It may be unnecessary, for example, to sever all links from enemy leadership to its forces. It may be sufficient to disrupt the timing and coherence of its military operations for a period.

The information suppression operation could include attacks on command and control networks, civil telecommunications, and even military and civilian leaders. Long-range ballistic missiles with high-explosive and earth-penetrating warheads, for example, could be used against leadership targets, including hardened facilities, while cruise missiles armed with electromagnetic-pulse warheads disrupted information networks. Some targets may be fixed and others mobile. Coordinating such an operation would include deciding which networks should be infiltrated and exploited and which ones destroyed.

However extensive prewar preparations, we are unlikely to ever enjoy perfect information about an enemy.[10] In the words of Jomini:

> [While it] *is unquestionably of the highest importance to gain [perfect] information, so it is a thing of the utmost difficulty, not to say impossibility; and this is one of the chief causes of the great difference between the theory and the practice of war.*[11]

We may fail to identify key nodes in an enemy's infrastructure or be unable to destroy those we attack. Nor will an enemy stand by passively as it is pummeled. Rather, it will attempt to repair individual targets, reestablish old networks, and build entirely new ones. Success will ultimately depend on destroying enemy information networks faster than they are rebuilt. Conducting rapid battle damage assessment and formulating and launching follow-on strikes before an enemy reacts may therefore be a key source of leverage.

An information suppression operation could shatter an enemy's will to fight and force it to sue for peace. If so, we may achieve Sun Tzu's ideal of victory without combat. Even should an information suppression operation fail to bring victory, we may hamper an enemy's capability to anticipate and react to our actions by disrupting its means of collecting and processing information. Moreover, we may reduce its capacity to transmit timely and coherent orders, thereby limiting its ability to coordinate its forces.

Having suppressed enemy information-gathering, we could attack capabilities that are vital to military operations. The selection of target systems will depend on the character of an enemy and our overall objectives. The scope and duration of the operation will depend on an enemy's sophistication and retaliatory capability as well as our ability to identify and swiftly strike its target systems. Against a relatively unsophisticated enemy with a limited infrastructure such an operation may be relatively straightforward; against a peer competitor it could involve the integrated use of tens of thousands of precision-guided munitions over hours or days. In any event, our capacity to inflict shock will depend on an ability to strike vital target systems in parallel over a short period.[12] In essence this was the approach of air planners prior to the Gulf War: rather than rolling back Iraqi air defenses before attacking strategic target systems, networks were bombed from the outset of the war.[13]

the ability to disrupt enemy information networks may deter aggression

Strategic air and missile defenses are a prerequisite to strikes against vital assets. Without them, an enemy could credibly threaten retaliation against U.S. forces and allies for strikes upon its homeland. Defenses could protect friendly forces and reduce an enemy's confidence in achieving its objectives by long-range strikes. Moreover, the combination of long-range precision strike and strategic defense may convince an enemy that continuing to employ offensive systems is futile. An enemy may instead decide to retain its forces for postwar bargaining.

A strategic campaign of the sort outlined above could prove insufficient to force an enemy to capitulate in and of itself. In such a case, we may need to deploy ground forces to defeat an enemy in the field. Long-range precision strikes may acquire a role as a precursor to theater power projection operations, just as naval gunfire has preceded amphibious landings. Such an operation could dismember an enemy's ability to command and control its forces, allowing our theater forces to defeat any remaining pockets of resistance in detail. At a minimum, it might disorient an enemy, reducing its ability to oppose the insertion of theater forces.

The combination of weapons of mass destruction and long-range precision weapons will make the future battlefield extremely lethal. To credibly project power abroad, we must develop organizations that fight effectively in such an environment. This may include the means to insert and extract forces rapidly. Once inserted in a theater, ground forces may have to disperse, reduce their signature, and move rapidly.[14] They may, in fact, come to resemble the Pentomic division, designed to operate on the nuclear battlefield.[15]

From Theory to Practice

No single concept of warfare can address the entire spectrum of conflicts we may face. The type of campaign described above, for example, will have limited utility at the low end of the warfare spectrum, though intelligence, surveillance, and reconnaissance capabilities may be useful in such contingencies. The combination of long-range precision strike and information warfare may instead provide our decisionmakers with expanded options to deter and wage war against regional powers or a peer competitor. The demonstrated ability to disrupt enemy information networks, for example, may deter aggression. Threats against command and control systems could render an enemy unable to direct its forces should war occur, while destruction of the civil telecommunications system could disrupt its economy. Moreover, in authoritarian states which rely upon repression for political control, such strikes could lead to civil unrest. The acquisition of long-range precision strike and information warfare may also provide options for non-nuclear extended deterrence of aggression against our friends and allies. While the emerging RMA is unlikely to provide a risk-free option for waging strategic warfare against a nuclear-armed enemy, at least without robust

strategic air and missile defenses, long-range precision strike and information warfare could accomplish some of those missions heretofore reserved for nuclear weapons.

We cannot, however, expect potential enemies to sit idly by as we amass the means to dismember them. They may take any number of steps to reduce our ability to bring long-range precision strike and information warfare assets to bear upon them. Perhaps the best way to deter us from employing shock warfare would be to acquire nuclear weapons. An enemy may also use camouflage, concealment, and deception to reduce our ability to identify and target key nodes in its infrastructure. Or it could move them underground. Over time, an enemy might even attempt to eliminate all key nodes. Centralized switched telephone networks could be replaced by distributed cellular networks, and national power distribution could be replaced by local networks. An enemy could also use information warfare techniques to disrupt our command and control networks.

Nor may we be free to conduct long-range precision strikes and information warfare based on military effectiveness criteria alone. In the future as today, the use of force will be limited by political considerations. We may, for example, be constrained from striking an enemy homeland, especially if it possesses the means to threaten us with weapons of mass destruction. Future wars could come to resemble not the Gulf War, where our Armed Forces were free to strike virtually any military target they wanted, but the Korean War, where concern over potential Chinese and Soviet responses restricted our actions and created a sanctuary from which enemy forces operated with impunity. Or our dependence on space systems for navigation, communication, and intelligence collection may translate into a reluctance to launch attacks against an enemy's space systems for fear of retaliation. The use of information warfare may likewise be restricted, especially during peacetime. The President might, for example, preclude the Armed Forces from infiltrating an enemy's networks for fear that discovery of such activities could provoke a conflict. Or it might preclude information warfare attacks on networks carrying both civilian and military data for fear of collateral damage.

The emerging military revolution will not eliminate Clauzewitzian friction. Nor will it usher in a new age of bloodless conflict. It may, however, offer us leverage against a range of enemies in peace, crisis, and war. Long range precision strike and information warfare capabilities may deter a potential enemy and offer coercive leverage to resolve crises and conflicts in our favor. Should we fail to exploit the emerging RMA, however, we may well find ourselves at the mercy of another power who has mastered it. **JFQ**

NOTES

[1] See, for example, A.J. Bacevich, "Preserving the Well-Bred Horse," *The National Interest,* no. 37 (Fall 1994), pp. 43–49; Mary C. FitzGerald, "The Russian Image of Future War," *Comparative Strategy*, vol. 13, no. 2 (April–June 1994), pp. 167–80; James R. FitzSimonds and Jan M. van Tol, "Revolutions in Military Affairs," *Joint Force Quarterly*, no. 4 (Spring 1994), pp. 24–31; Andrew F. Krepinevich, Jr., "Keeping Pace with the Military-Technological Revolution," *Issues in Science and Technology*, vol. 10, no. 4 (Summer 1994), pp. 23–29; and Andrew F. Krepinevich, "Cavalry to Computer: The Patterns of Military Revolutions," *The National Interest* , no. 37 (Fall 1994), pp. 30–42.

[2] William A. Owens, "The Emerging System of Systems," *U.S. Naval Institute Proceedings*, vol. 121, no. 5 (May 1995), pp. 35–39.

[3] Implementing such a concept puts a premium on the ability to gather, correlate, interpret, and transmit information much more rapidly than previously possible. This then poses daunting challenges to data fusion, high-data-rate communications, and inexpensive precision munitions. See James R. FitzSimonds, "The Coming Military Revolution: Opportunities and Risks," *Parameters*, vol. 25, no. 2 (Summer 1995), p. 34.

[4] See John Arquilla and David Ronfeldt, "Cyberwar is Coming!" *Comparative Strategy*, vol. 12, no. 2 (April–June 1993), pp. 144–46; and Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (New York: Little, Brown and Company, 1993).

[5] In some ways, the Gulf War represented the first attempt to implement such a strategy. Coalition air campaign planners hoped to strike at Iraq's central nervous system by attacking the leadership, telecommunications, and electric power systems to paralyze the regime in Baghdad. See Thomas A. Keaney and Eliot A. Cohen, *Gulf War Air Power Survey*, volume I, *Planning and Command and Control* (Washington: Government Printing Office, 1993), pp. 109–11.

[6] A similar strategy was favored by ancient Chinese generals who viewed operations as the interaction of ordinary force (*cheng*) and extraordinary or unconventional force (*ch'i*). The former fixed and made an enemy vulnerable to unconventional force, a flanking maneuver that disrupted enemy strategy and forced capitulation. See the discussion in Sun Tzu, *The Art of War*, translated by Samuel B. Griffith (London: Oxford University Press, 1963), pp. 42–43.

[7] Conversely, lacking reconnaissance, surveillance, and data processing, an enemy may be able to make up for a relatively low level of information by employing its forces *en masse*.

[8] See Edward A. Smith, Jr., "Putting It Through the Right Window," *U.S. Naval Institute Proceedings*, vol. 121, no. 6 (June 1995), pp. 38–40.

[9] See John A. Warden III, "The Enemy as a System," *Airpower Journal*, vol. 9, no. 1 (Spring 1995), pp. 40–55.

[10] Kenneth F. McKenzie, Jr., "Beyond Luddites and Magicians: Examining the MTR," *Parameters*, vol. 25, no. 2 (Summer 1995), pp. 17–19.

[11] Baron de Jomini, *The Art of War*, translated by G.H. Mendell and W.P. Craighill (Philadelphia: J.B. Lippincott & Co., 1862), p. 245.

[12] For a cogent critique, see Richard Szafranski, "Parallel War: Promise and Problems," *U.S. Naval Institute Proceedings*, vol. 121, no. 8 (August 1995), pp. 57–61.

[13] Keaney, *Gulf War Air Power Survey*, volume I, chapter 1.

[14] Gordon R. Sullivan and James M. Dubik, *Land Warfare in the 21st Century* (Carlisle Barracks, Pa.: Strategic Studies Institute, U.S. Army War College, 1993), pp. 12–25.

[15] See, for example, A.J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam* (Washington: National Defense University Press, 1986), chapters 3 and 5.

Time

The New Dimension in War

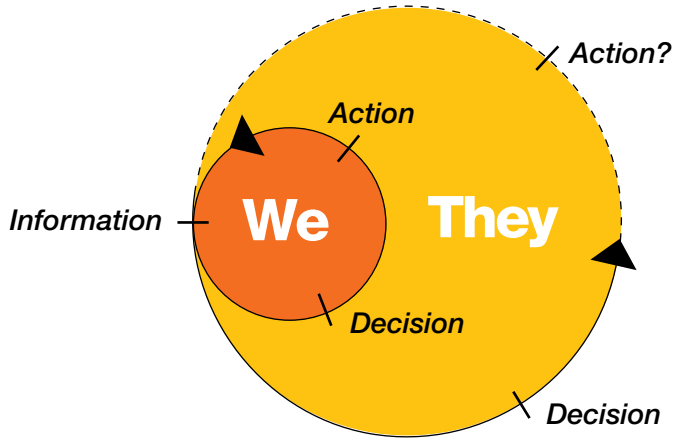
By AJAY SINGH

Success and failure in war—as in most human endeavors—rests on the ability or failure to create and exploit asymmetries in capabilities and action. These asymmetries result from a process of technological revolution and evolution, based on microrevolutions, and generalship that exploits them in time and space. Methods of warfighting undergo changes through microrevolutions that are usually driven by innovations such as the stirrup, crossbow, gunpowder, steamship, wireless, et al. A revolution in military affairs (RMA) occurs when there are essential changes in the nature of war requiring a reassessment of the way we plan and conduct warfare. This revolution displays a shift in the center of gravity of military activity. The common denominator is a growth in either mobility or firepower, or both, that increases the premium on time and space. Throughout history time and space have been played against each other to gain advantage in battle. With the passing of the years, time has gradually been compressed while space has expanded.

Squadron Leader Ajay Singh, Indian Air Force, is a fighter pilot assigned to Air Headquarters in New Delhi.

The pace of war has changed little over the centuries, and therefore warriors did not really experience the compression of time. With the advent of airpower, warfare expanded into a third dimension, and the process of creating asymmetry was lifted to a new dimension. Airpower thus constituted an RMA, the impact of which started to be felt with the end of World War I. Today we are at the threshold of new technologies which promise to enlarge the battlefield even more and shrink the time available for decisionmaking and action to critical levels. Their net effect—whether long-range weapons or information warfare technologies—will be to tighten the decision loop until an asymmetry created in time proves to be decisive. This new revolution can therefore be termed the advent of the fourth dimension—*time*.

IDA Cycle in "T time"



Note: The continuous line in the figure represents "T time" which is the time to complete the cycle. For an enemy, the time to complete the cycle is "T plus time" which leads to a time differential that causes a lag in its response with resulting adverse asymmetry.

Two-Dimensional Warfare

For centuries war was confined to two dimensions, breadth and depth. Combat at sea and on land remained limited to these two dimensions even as the area of battle expanded. Subsurface warfare at sea did not alter the basic dimension, although it did expand conflict in space. Advances in military technology primarily contributed to increased mobility and firepower in terms of depth and breadth. Many technological advances led to an impact on the methodology of warfighting and thus can be called microrevolutions. Their effect enhanced speed and lethality in battle, though the results were spread over time, perhaps centuries.

One early microrevolution was the expansion of the battlefield by cavalry. With enhanced mobility, forces could engage at longer ranges more quickly. This was the way in which Mongol cavalry swept across Asia. Another microrevolution was the stirrup, giving horsemen enhanced firepower on the move.[1] The English longbow and 10th century crossbow also caused changes in tactics. Gunpowder in the 15th century further increased firepower, while the grooved rifle which was fielded during the Civil War increased accuracy and further expanded the battlefield, although within existing limits of time and space.

The Industrial Revolution heightened the pace as well as intensity of combat, which led to greater lethality and to the industrialization of war. The tank, introduced in World War I, included elements of enhanced mobility and firepower in a single vehicle, although its real significance was not recognized until World War II when combat became even more violent. Armored warfare, however, was confined to the dimensions of breadth and depth, and continued to require the forces of one nation to defeat those of another to impose its will. Though many developments had taken place over the centuries, warfare remained tied physically to the surface (either on land or at sea), and was hence two-dimensional. It was the acceleration of technological changes beginning in the 20th century that led to a major revolution in the nature of warfighting.

airpower extended warfare into the third dimension, making it possible to target a nation directly

Third Dimension

The advent of airpower extended warfare into the third dimension, making it possible to target a nation—and its will—directly and thus conquer territory without destroying enemy forces. That began with the aerial bombardment from Austrian balloons during the siege of Venice in 1849 which led to calls for a permanent ban "on the discharge of any kind of projectile or explosive from balloons or by similar means" at the Hague in 1899.[2] While the ban was not adopted, destruction from the air clearly heralded a fundamental change in military affairs. Ten years before the flight of the Wright brothers, J.D. Fullerton of the British army's Royal Engineers spoke of a "revolution in the art of war" where "the chief work will be done in the air, and the arrival of the aerial fleet over the enemy's capital will probably conclude the campaign."[3] Other strategists such as Douhet and Mitchell elaborated on the concept later, but they were more prophets than strategists.[4]

Although forerunners of the third dimension recognized the impact airpower would have on war, technology did not mature in the earlier decades to a level where it had a revolutionary effect. It was a case where doctrine ran ahead of technology, giving rise to

misgivings and skepticism. Much of the problem in understanding airpower even today is due to the fact that landpower and seapower doctrine is based on centuries of experience while airpower is only a hundred years old. But if our understanding of airpower has been clouded for these reasons, Fullerton's vision of the third dimension as a revolution in warfare has been amply vindicated over the last century.[5]

Airpower had developed sufficiently by World War I that it could be employed in combat. Between wars, it matured enough to contribute substantially in World War II, and warfare in the surface medium (including subsurface) could not keep pace with changes in the third dimension. The maturing of technology in World War II facilitated use of doctrine envisioned in earlier years. One classic example of the revolutionary impact of airpower was the *Blitzkrieg* concept, where dive bombers leading *panzer* thrusts rapidly destabilized and disrupted defenses into defeat.[6] The Battle of Britain changed the course of the war itself, resulting in the cancellation of German plans for the invasion of England. The ability of airpower to target surface forces from the third dimension was an influence on the surface battle, especially in the North African campaign.[7] Besides its offensive employment for destruction, the third dimension airlifted troops and materiel, thus enhancing the mobility of surface forces by air transport or airborne operations. Creating major asymmetries in time and space by exploiting the third dimension literally lifted traditional two-dimensional warfare to nonlinear dimensions. The struggle to control the third dimension itself became a major military aim.[8] Strategic bombing may not have achieved the expected objectives, but the atomic bombing of Hiroshima finally established what the prophets had forecast.

The intensity of the revolution continued into the nuclear age, with significant advances in levels of technology. The most obvious fallout in the post-war era was a total shift in the currency of power to the third dimension through nuclear weapons that were air deliverable. The increased use

AWACS.

U.S. Air Force

of the electromagnetic spectrum and a move toward more accurate aerial weapons profoundly affected warfighting. Though the electromagnetic spectrum was significant during World War II, its exploitation matured in Vietnam when precision guided munitions (PGMs) made an operational appearance. The maturing of electronic warfare is a microrevolution in military affairs and a subset of the third dimension since it is primarily conducted through, for, and against activities in the third dimension.[9] While PGMs provide greater accuracy and timeliness, they must be backed through reconnaissance, surveillance, and target acquisition (RSTA) technologies to be effective. Increased military use of space has led to a scenario of space-based weapons and defenses. A move toward continuous asymmetry above the earth was evident in the SDI technology of the Reagan era.[10]

The last hundred years of warfare in the third dimension has clearly shown that airpower (including space) has fulfilled its promise of being a true revolution. It is dominant in combat; and while it may not achieve victory alone, airpower is nevertheless essential to winning a war. Even in Vietnam it was not that airpower failed as some claim; it was an ill-defined threat combined with unclear political objectives that fettered the third dimension. Airpower remained critical as seen in the defense of Khe Sanh or in Linebacker II.

Around the same time, the Arab-Israeli war proved that airpower had the potential to decide the outcome of surface war. In the 1982 Bekaa Valley operations, Israel used the third dimension in a decisive manner.[11] This was repeated by the U.S.-led coalition in the Persian Gulf War, albeit on a larger scale. This was also perhaps the first war when information was employed extensively to create conditions conducive to victory. Satellites provided real-time information to operational commanders. U.S. Space Command assets were critical for cuing Patriot batteries. Time was of importance in such missions and all efforts were made to obtain real-time information, whether for targeting Scud launchers or battlefield targets. This war was the first where real-time information was a reality, and the results indicated that the time had come for it to play a crucial role in combat. While the coalition benefitted from compressed time-cycles, Iraqi time-cycles had distended to such a degree that they became totally irrelevant. This war was for all practical purposes a combination of the potency

of the third dimension and the use of sophisticated technology to shrink the time for decision-action synergy. To that extent, this war was the overlap in which signs of another RMA could be seen—the advent of the fourth dimension of war.

Fourth Dimension

The nature of the battlefield is undergoing transformation. Fully automated warfare may be technologically feasible in the next twenty years.[12] Airpower has provided a dynamic platform for change. Its early signs were apparent in the Bekaa Valley where nonlinearity from technological advances helped to destroy Syrian forces at the front and to stop the Syrian 3d Armored Division in its tracks before it reached the battle. The doctrine was incorporated in the AirLand Battle concept, which spoke of an extended battlefield where airpower would engage follow-on forces and enemy targets in depth. During the Gulf War the indications were much clearer that future conflict would involve extensive use of technology to conduct the battle at extended ranges and compressed time. With further advances in technology, the battlefield can be expected to expand even more. Hitting targets at long range with precision RSTA technologies is critical and translates into the accuracy and time sensitivity of information. While accuracy is a matter of acquisition and guidance sensor technologies, time on the expanded battlefield needs greater attention. Technologies of the future may provide highly accurate information which satisfies needs on all levels of war, although if it is not timely it could be worthless. The result will be a new dimension—time—which promises to envelop the other dimensions of war as a force multiplier and counterforce divider.

time promises to envelop the other dimensions of war as a force multiplier

Although time has always been a factor in war, technology has never been at a stage where it could play an independent and dominant role in shaping conflicts. The slow pace of war when it was confined to two dimensions also meant that the human decisionmaking loop was never pushed to its time limits by the demands of battle management. It was not that time did not play a key role; rather, the advantage offered by timely information was often overshadowed by the relatively large time required to act on it. Notwithstanding this, time has always been crucial to surprise.[13]

Reorienting the IDA Cycle

With the inherent mobility and firepower of airpower, the expansion of war to the third dimension largely changed the factor of time. The dimension of time began to be recognized as more important, and conscious efforts were made to reduce the time required to gather information, disseminate it, make a decision, and follow it up by action. In the 20th century, rapid technological advancement has reduced the span needed to know, decide, and act with the result that time has been shrinking, while space (the extent of the battlefield) has been expanding. This may lead to a state of seamless space, where borders become even less relevant in the conduct of war, and time assumes the form of boundaries. This border of time will be the decisive factor of war and will call for orienting the information-decision-action (IDA) cycle in terms of time.

The IDA cycle is a basic element of the dimension of time in military affairs and represents a set of activities required in all of them. The size of the loop is a demonstration of the time taken to achieve a specific task. The faster this cycle is completed, the greater the compression of time. The aim, when operating in this dimension, is to shorten the cycle as much as possible and thereby retain the advantage of time over an enemy. It is important to understand that each component of the cycle has its own subcycles and, accordingly, the time needed for a given task is the sum of the time required to complete each of the subcycles and the overall cycle itself.

Some tasks may call for completing a number of cycles before the action reaches finality. The time dimension will then be that much more dilated compared to single-cycle tasks. The IDA cycles required for a particular task, such as neutralizing a target system, depend on the nature of that system—the vulnerability and recuperability of subsystems, and the accuracy and effectiveness of one's own decision and action components of the IDA cycle. The probability of a single-cycle task is very low, considering that some cycle overrun would be needed for a reasonable degree of assurance of task achievement. But the objective clearly must be the reduction of the number of cycles required for a particular task, as close to unity as possible, along with compression of each cycle (time), since the total term taken would be the sum of all cycles.

One method of achieving this would be identifying the weak links in the IDA cycle, then incorporating appropriate solutions to strengthen the cycle, or in other words reducing the subcycle or cycle time. The solution selected could, depending on the problem area, be based on improving procedures or technological modifications or innovations. The rule of the chain applies here—that is, the strength of the cycle in terms of time will often be only as strong as the weakest link of the cycle (again in terms of time). Delays in one segment, therefore, may well be the deciding factor. Conversely, degradation of hostile IDA cycle, based on identifying weak or vulnerable positions of the cycle and attacking it at a faster pace than it can recuperate, could prove decisive in one's favor. For example, targeting Saddam's command and control functions led to an asymmetry where his IDA cycle was totally degraded in the early hours of the war, and he was incapable of responding in a meaningful time-frame, though other components of military power were available. Another example is planning airfield denial missions by designing their frequency to stay within an enemy's airfield rehabilitation ability in terms of time. A striking

case of time versus time is the frequency-hopping technique used by radars as an electronic counter-countermeasure in a race in the fourth dimension, against the effects of hostile electronic countermeasures.

Of the advances underway, the most significant are in the information segment of the cycle. In fact, this segment is technologically more dependent than the others, and thus the payoffs are likely to be much greater. This has been recognized by many experts, some of whom have called information a new revolution in war. While the role of information in the time dimension deserves special attention, it must be recalled that information is merely a means to an end, not an end in itself. It must be seen as part of the overall IDA cycle, although a critical component of the fourth dimension. Information warfare involves using information to one's advantage and also denying its benefits to an enemy. Under close scrutiny, therefore, information entails degrading, delaying, and disrupting information to confuse an enemy and increase response time. The greatest change in the information campaign over the years has been the expansion of the quantum of information which can be made available and the contraction of processing time (a microrevolution in itself).

The speed and volume of information, although an asset in the fourth dimension, can create vulnerabilities. Even with reduced processing time, there is a possibility of information overload, creating congestion and delays in using information. Thus there will be an inescapable need for the information to be time-sensitive. The amount of data processed will be greater than the processing power of the information system and, therefore, information technology application in combat has become more susceptible to the time factor. And since it is actually a subset of the IDA cycle, it is correct to term the advances in information technology as incremental to the criticality of the time dimension, hastening the advent of the fourth dimension as a true RMA.

M–1 Abrams.

U.S. Army

Targeting Time Cycles

Had Saddam Hussein thought in the fourth dimension, he might have realized that the only chance that Iraq had of success was the disruption of the coalition build-up during Desert Shield, which offered a window of vulnerability as the allies mobilized. The point was not whether Iraq could have defeated the coalition in battle, but recognition that the war would have followed a different course if the fourth dimension had been exploited. The coalition did control and exploit it to a certain extent, as seen in the interception of Scud missiles, which would otherwise have been extremely difficult. It is worth noting that after the war the Pentagon initiated programs such as the Joint Precision Strike Demonstration Task Force (JPSDTF) to reduce sensor-to-shooter timelines. The goals of JPSDTF include reducing timelines, now measured in hours, to two minutes.[14] This is a clear recognition of the impact of the fourth dimension in warfighting. In fact, the question of ballistic missiles being a destabilizing factor is essentially linked to the fourth dimension, as these missiles, especially short range ones, do not give the IDA cycle of the defender adequate time to mount a response even if the means exist. Tightening the cycle beyond reasonable human control was no doubt a major factor that led to the intermediate nuclear force treaty since vulnerabilities on both sides increased inversely to the tightening of the cycle dictated by the missiles. The first step in defending against the missile threat thus lies in the fourth dimension as any anti-missile defense system designer must recognize. SDI did this by developing technologies that promised to reduce the time needed for early warning and boost-phase/mid-course interception. The Soviet objections to SDI also resulted from the implicit adverse asymmetry of the relative IDA cycle.

As airpower demanded airpower to counter it, so will the new dimension of time require its war to be fought in the fourth dimension. Just as air superiority was a prerequisite to successful warfare in the third dimension, freedom of action and control of the fourth dimension will become necessary to operate on future battlefields. This will lead to the targeting of time cycles to degrade an enemy cycle, while safeguarding one's own from enemy interference. The objective of causing an asymmetry in this dimension will demand thought and action to create a time differential where the

IDA cycle for an objective on any level of war starts and finishes before the response time or enemy IDA cycle. If one completes the cycle in "T time," forcing an enemy to complete its cycle in "T-plus time," one creates a time differential. In other words, to conduct time warfare one must stay within the enemy IDA cycle, thus gaining control of the fourth dimension. Only with control of time can one exploit this dimension and subsequently fight in other dimensions. If control of time is lost it is likely to pass on to the other side, and the side which loses the race for control of the fourth dimension will find itself continuously sliding down in its time cycles. Recovery may be made difficult by a domino effect influencing current and future cycles. The side that controls time will be in a superior position to conduct war in all dimensions.

the side that controls time will be in a superior position to conduct war in all dimensions

Centuries of conflict have proven that offensive action provides the greatest control in any dimension of warfare, and time is no exception. In fact, considering the potentially destabilizing nature of time warfare, the fourth dimension favors the offensive more than any other dimension. Traditional military organizational structures may require redefinition to suit demands of war in the new dimension to pass the litmus test of a small IDA cycle. Plans must ensure that nodal points, vulnerable to enemy interference, are kept to a bare minimum. Hardening organizational structures against interference should be done using physical and software solutions to provide counterforce dividers. At the same time, the ability to create friction must exist to degrade enemy IDA cycles.[15] Integrating technologies—artificial intelligence, JTIDS, JSTARS, AWACS, et al.—is fundamental to the reorientation of military structure.

In the future a number of countries are likely to reduce their IDA cycles, enabling them to fight in the fourth dimension. It is hard to see a serious challenge to the United States on the global level for the next quarter century. Only Japan has the requisite technological strength. But intent is another matter altogether. Although Russia now lags in fourth dimension technology compared to the United States and Japan, it can be expected to catch up. At the regional level, however, the key question that U.S. forces will confront is whether they have sufficient power in place to counter a belligerent able to exploit the fourth dimension. If not, they may be threatened by the dynamics of the IDA cycle before reinforcements can be deployed. Between other states, the conflict would be shaped by the relative capabilities of sides in the fourth dimension and how these are exploited.

Of all emerging technologies, the most significant impact on the fourth dimension may be the trans-atmospheric vehicle (TAV). This technology will make it possible to rapidly launch small satellites to provide cover of an area in the event of the regular sensors being incapacitated through antisatellite warfare, which is expected to increase as reliance on the sensors grows to cut down the IDA cycle. TAV can also be employed in an antisatellite role since it will provide a highly accurate, flexible, and low-IDA cycle option with on-board directed and kinetic energy weapons. Thus the impact of the fourth dimension is likely to increase exponentially based on the capability of TAV which, flying at a speed of Mach 30, will be able to target a point on the surface of the earth from its ground station in thirty minutes. It will therefore become virtually impossible to think without operating in the dimension of time when planning and conducting war. **JFQ**

NOTES

[1] R. Ernest Dupuy and Trevor N. Dupuy, *The Encyclopedia of Military History* (London: McDonald, 1970), p. 137.

[2] Jasjit Singh, "Evolution of Politico-Military Doctrines," in Jasjit Singh and Vatroslav Vekaric, editors, *Non-Provocative Defence* (New Delhi: Lancer Press, 1990), pp. 17–18.

[3] David MacIsaac, "Voices from the Central Blue: The Air Power Theorists," in Peter Paret, editor, *Makers of Modern Strategy: From Machiavelli to the Nuclear Age* (Princeton: Princeton University Press, 1986), p. 627.

[4] Giulio Douhet, *The Command of the Air*, translated by Dino Ferrari (New York: Coward-McCann, 1942), pp. 11–16.

[5] Tony Mason, *Air Power: A Centennial Appraisal* (London: Brassey's, 1994).

[6] Harold Faber, *Luftwaffe: An Analysis by Former Luftwaffe Generals* (London: Sidgwick and Jackson, 1979), p. 165.

[7] J.F.C. Fuller, *The Second World War, 1939–1945: A Strategical and Tactical History* (New Delhi: The English Book Store, 1969), pp. 220–59.

[8] Jasjit Singh, *Air Power in Modern Warfare* (New Delhi: Lancer International, 1985), pp. 1–33.

[9] Some regard electronic warfare as the fourth dimension; Ibid., pp. 122–37.

[10] Simon P. Warden, *SDI and the Alternatives* (Washington: National Defense University Press, 1991), pp. 159–60.

[11] Eliezer "Cheetah" Cohen, *Israel's Best Defence*, translated by Jonathan Cordis (New York: Orion Books, 1993), p. 468.

[12] Frank Barnaby, *The Automated Battlefield* (London: Sidgwick and Jackson, 1986), p. 141.

[13] Richard E. Simpkin, *Race to the Swift: Thoughts on 21st Century Warfare* (London: Brassey's Defence Publishers, 1985), pp. 182–84.

[14] John Boatman, "Army Plans Two-Minute Warning," *Jane's Defence Weekly* (June 17, 1995), p. 27.

[15] Carl von Clausewitz, *On War*, Anatol Rapoport, editor (London: Penguin Books, 1968), pp. 164–67.

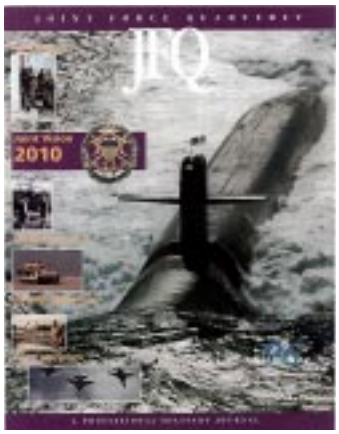
This article was submitted as an entry in the 1995 RMA Essay Contest.

Cumulative Index (1993–98)

ISSUES 1–18: CONTRIBUTORS

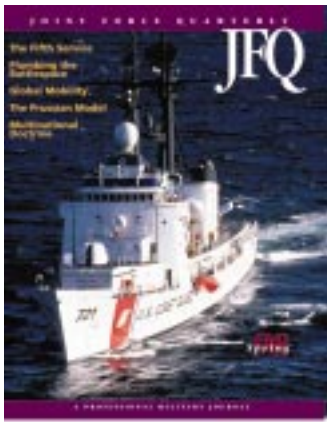
Every article listed in this index can be found on the web.

http://www.dtic.mil/doctrine/jel/jfq_pubs/index.htm



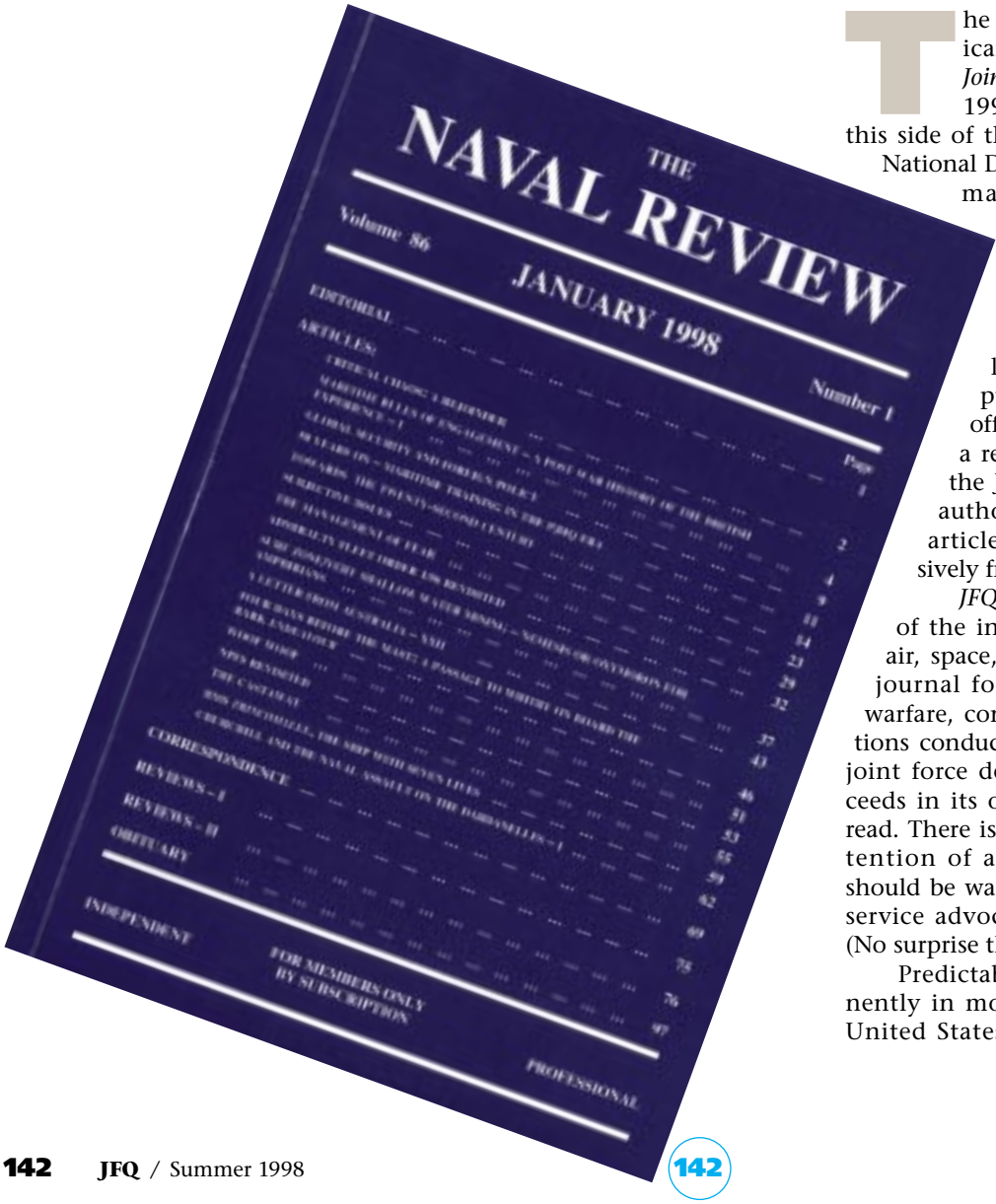
Every article listed in this index can be found on the web.

http://www.dtic.mil/doctrine/jel/jfq_pubs/index.htm



JFQ—Seen from

The following appraisal of *Joint Force Quarterly* appeared in volume 86, number 1 (January 1998) of *Naval Review*, a professional military journal published in the United Kingdom. It was written by Lieutenant Commander J.R. Stocker, Royal Navy Reserve, who has contributed to past issues of *JFQ*.



The newest, and one of the better, American military professional journals is *Joint Force Quarterly*. First published in 1993, it is still not widely known on this side of the Atlantic but deserves to be. The National Defense University (NDU) is the alma mater of "jointness" in the United States, and these days every ambitious officer needs to get his "joint ticket" punched if he is to rise beyond commander/lieutenant colonel. *JFQ*'s glossy format with lots of good pictures belies its serious purpose and content. Despite being officially sanctioned and funded, with a regular foreword by the Chairman of the Joint Chiefs, it contains a wealth of authoritative, original, and questioning articles, overwhelmingly but not exclusively from serving U.S. officers.

JFQ exists "to promote understanding of the integrated employment of land, sea, air, space, and special operations forces. The journal focuses on joint doctrine, coalition warfare, contingency planning, combat operations conducted by the unified commands, and joint force development." By and large, it succeeds in its objectives and is invariably a good read. There is always something to attract the attention of a diverse readership, though one should be wary of the occasional piece of single-service advocacy masquerading as "jointness." (No surprise there.)

Predictably, joint doctrine features prominently in most issues. The joint empire in the United States extends much more widely and

Afar

deeply than in the United Kingdom, though interservice rivalries are as great, and in some important respects U.S. forces on the ground are no more truly integrated than those of their allies. Indeed, one often detects an underlying feeling (somewhat justified) on the part of the Navy-Marine Corps "team" that they've always been joint in all warfare environments, and what's the big fuss about? The United States has not one or two joint doctrine publications, but more than a hundred, including JTTP 4-02.2, *Patient Movement*; JTTP 3-55.1, *Unmanned Aerial Vehicles*; JTTP 1-06, *Financial Management*, as well as more significant books on joint intelligence, amphibious operations, information warfare, air defense, and so on. At the higher levels of joint doctrine in the United States is clearly an evolving process, and a recent article specifically identified doctrine as still not a part of naval culture.

A recurring theme in *JFQ* is the American revolution in military affairs. The RMA debate is making an appearance in the United Kingdom, but its true home is in the United States. Americans have always had a more technologically-focused military and strategic culture, and the information warfare concept is but the latest embodiment of that. In the future it will be "cyber-war," in which computers do not just aid conventional weapons to do their job more effectively but become weapons in their own right, disabling vital parts of a modern state's infrastructure "on the net"—a form of warfare that the United States is probably more vulnerable to than most. The extent to which the application of new technologies is fundamentally altering the nature of warfare is hotly debated, but the U.S. military is deeply committed to the hypothesis that "information superiority" will enable them to assert and maintain "battlespace dominance," employing precision stand-off systems that minimize casualties and collateral damage. Some of the more skeptical views on this come from the Marine Corps, whose concept of "Operational Maneuver . . . from the Sea" seeks nonetheless to bypass the beach and reduce their "footprint" ashore by exploiting superior maneuverability.

An annual RMA essay contest produces a wide selection of forward-looking pieces ranging from philosophical views on the future of armed conflict, such as "Dynamic Inter-Dimensionality," to the very specific, such as "Acoustics on the 21st Century Battlefield."

Historical pieces regularly appear, especially on World War II, and often purport to draw lessons from the past that can be applied in the future—always a contentious undertaking. The Middle East, ballistic missile defense, training and simulation, military operations other than war, and European defense have been other recent themes. Many articles are very U.S.-specific, but a larger number have a much wider appeal and provide good material for anyone interested in the current and future state of armed conflict and military operations.

To understand what the American defense establishment is doing and thinking, look no further. To get real insights into "the higher aspects" of the military profession, again you will be hard pressed to find a better source. It can be depressing to see how much original, well-argued, and thoughtful work is produced by U.S. officers, in somewhat stark contrast to the continuing anti-intellectual culture that still permeates our own armed forces. One should note, however, how much of *JFQ*'s content does originate from commanders, their staffs, and teaching establishments.

Much as *Proceedings* gets a regular airing in the *Naval Review*, it is planned to review *JFQ*'s content in the future on an annual basis.

DISTRIBUTION: *JFQ* is distributed to the field and fleet through service channels. Individuals and organizations interested in receiving the journal on a regular basis should make their requirements known through command channels. Any corrections in shipping instructions for service distribution should be directed to the appropriate activity listed below.

- **Army**—Contact the installation publications control officer (citing Misc. Publication 71–1) or write: U.S. Army Publications Distribution Center, ATTN: Customer Service, 1655 Woodson Street, St. Louis, Missouri 63114–6181, or call (314) 263–7305 / DSN 693–7305 (extension 286); or order via Starpubs or the Internet [http://www.usappc.hoffman.army.mil].
- **Navy**—Contact the Navy Inventory Control Point, Customer Service List Maintenance (Code 3343.09), 700 Robbins Avenue, Philadelphia, Pennsylvania 19111–5098; requests may be sent by Fax to (215) 697–5914 (include SNDL, UIC, and full address).
- **Marine Corps**—For one-time distribution of an individual issue write to Marine Corps Logistics Base (Code 876), 814 Radford Boulevard, Albany, Georgia 31704–1128; request by Fax at (912) 439–5839 / DSN 567–5839. To be placed on standard distribution contact Headquarters, U.S. Marine Corps (Code ARDE), Federal Building No. 2 (Room 1302), Navy Annex, Washington, D.C. 20380; request by Fax at (703) 614–2951 / DSN 224–2951.
- **Air Force**—Submit AF Form 764A with short title "JFQN (indicate issue number)" to the base publications distribution office to establish unit requirement through the Air Force Distribution Center, 2800 Eastern Boulevard, Baltimore, Maryland 21220–2896.
- **Coast Guard**—Contact Headquarters, U.S. Coast Guard, ATTN: Defense Operations Division, 2100 2d Street, S.W., Washington, D.C. 20593–0001.

In addition to service channels, bulk distribution is made directly to defense agencies, the Joint Staff, unified commands, service colleges, and other activities. Changes in shipping instructions should be communicated to the Editor (see schedule below).

SUBSCRIPTIONS: *JFQ* is available by subscription from the Government Printing Office. To order for one year, cite: *Joint Force Quarterly* (*JFQ*) on the order and mail with a check for $17.00 ($21.25 foreign) or provide a VISA or MasterCard account number with expiration date to the Superintendent of Documents, P.O. Box 371954, Pittsburgh, Pennsylvania 15250–7954, or Fax the order to: (202) 512–2233.

Individual copies may be purchased through GPO bookstores nationwide for $8.00 each.

CONTRIBUTIONS: *JFQ* welcomes submissions from members of the Armed Forces as well as from both defense analysts and academic specialists from this country and abroad, including foreign military officers and civilians. There is no required length for contributions, but manuscripts of 3,000 to 5,000 words are appropriate. Other submissions, however, to include letters, commentary, and brief essays are invited. Reproductions of supporting material (such as maps and photos) should be submitted with manuscripts; do *not* send originals. Unsolicited book reviews are generally not accepted for publication.

All submissions to *JFQ* must be accompanied by a covering letter which states that the manuscript has not been previously published and is not being submitted simultaneously to any other publication. In addition, the letter must include the author's full name (including military grade, service/component, and assignment if applicable), a complete postal address (with Zip code), and a work telephone number. Submissions which do not comply with these conditions may not be considered for publication. Neither facsimile nor e-mail manuscripts will be accepted as formal submissions.

All unsolicited manuscripts are reviewed, a process which may take two to three months. To facilitate review, provide three copies of the manuscript together with a 150-word summary. Place personal or biographical data on a separate sheet of paper and do not identify the author (or authors) in the body of the text. Follow any accepted style guide in preparing the manuscript, but endnotes rather than footnotes should always be used. Both the manuscript and endnotes should be typed in double-space with one-inch margins.

JFQ reserves the right to edit contributions to meet space limitations and conform to the journal's style and format. Proofs of articles accepted for publication are not normally returned to authors for review.

Unless evidence of prior clearance is provided, all manuscripts selected for publication which are contributed by members of the U.S. Armed Forces or employees of the Federal Government are forwarded to the Office of the Assistant Secretary of Defense for Public Affairs to undergo security review. No honorarium or other form of payment is authorized for the publication of articles submitted by servicemembers or U.S. Government employees.

If possible submit the manuscript on a disk together with the typescript version. While 3.5- and 5.25-inch disks in various formats can be processed, WordPerfect is preferred (disks will not be returned unless requested). Information on the submission of contributions is available by contacting (202) 685–4220 / DSN 325–4220, Fax: (202) 685–4219 / DSN 325–4219, or writing to the Editor, *Joint Force Quarterly,* ATTN: NDU–NSS–JFQ, 300 Fifth Avenue (Bldg. 62), Fort Lesley J. McNair, Washington, D.C. 20319–5066. JFQ

DISTRIBUTION SCHEDULE

A total of 35,000 copies of *Joint Force Quarterly* is distributed worldwide. Of this number, more than 18,500 copies are sent directly to the five services for break down and delivery to subordinate commands, units, bases, etc. Bulk shipments also are made to the following organizations:

	copies
Office of the Secretary of Defense	400
Joint Staff and Joint Activities	700
Services	
Army	4,000
Navy	6,500
Marine Corps	1,500
Air Force	6,500
Coast Guard	125
Unified Commands	
U.S. European Command	275
U.S. Pacific Command	275
U.S. Forces Korea	75
U.S. Forces Japan	50
Alaska Command	25
U.S. Atlantic Command	150
U.S. Southern Command	150
U.S. Central Command	275
U.S. Strategic Command	275
U.S. Space Command	150
U.S. Special Operations Command	150
U.S. Transportation Command	100
Defense Agencies	
Defense Information Systems Agency	125
Defense Intelligence Agency	150
Defense Logistics Agency	150
Defense Mapping Agency	25
Defense Nuclear Agency	25
National Security Agency	25
PME Institutions	
U.S. Army War College	600
U.S. Army Command and General Staff College (including the School of Advanced Military Studies)	1,525
Naval War College (both resident and nonresident programs)	1,750
Naval Postgraduate School	300
Marine Corps War College and Marine Corps Command and Staff College	400
Air War College	450
Air Command and Staff College (including the School of Advanced Airpower Studies)	900

In addition to the above, approximately 3,500 copies of *JFQ* are distributed to general/flag rank officers and members of Congress; service doctrine centers; U.S. and foreign military attachés; and selected educational institutions, journals, and libraries in this country and abroad.


F 2

JFQ

JOINT FORCE QUARTERLY

Published for the
Chairman of the Joint Chiefs of Staff
by the Institute for National Strategic Studies
National Defense University
Washington, D.C.