# Tools for Transformation: The Military Requirements Process

A Research Paper

by

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## *Abstract*

TOOLS FOR TRANSFORMATION: RESHAPING THE MILITARY REQUIREMENTS PROCESS by Lt Col W. Bruce Rember, USAF. 38 Pages

This paper argues that recent improvements to the service and joint requirements process have set the stage for a successful transformation of American military forces to exploit new opportunities and prepare for uncertain challenges in the 21st Century. While the transformation envisioned is evolutionary, the paper emphasizes the need for vigorous implementation of evolutionary changes in order to avoid having radical reforms imposed that might "break" the force. The paper begins by examining some of the planning factors that impact determination of new military requirements. It then briefly reviews what key functions the requirements process should accomplish, considering recent organizational and process changes as well as wide ranging criticism. The paper concludes by recommending some additional "evolutionary" improvements that are critical to ensure the requirements process facilitates technological innovation and increased interoperability for joint forces.

## *Preface*

This information in this paper represents a portion of the author's research done in support of the Harvard/Stanford Defense Organization and Management (DOAM) Project. The author gratefully acknowledges guidance and mentoring from General John Shalikashvili, United States Army retired, a principal member of the DOAM Project. General Shalikashvili's insights on senior civilian and military decision-making processes were invaluable, and his ability to capture the essentials of the process without delving into the bureaucracy of the planing, programming and budgeting system helped keep this paper focused on broad issues rather than incremental administrative details. Additionally, the collaborative efforts of Lieutenant Commander Phil Ehr, United States Navy and a National Security Affairs colleague at the Hoover Institution were essential in gathering information and providing and soliciting feedback for the main arguments. Of particular note, his inputs on command and control and the national foreign intelligence budget form the basis for the recommendations concerning information superiority. While the ideas expressed in this paper do not necessarily reflect official Department of Defense or Department of the Air Force policy, the author is thankful for the candid critiques provided by numerous individuals within the staff of the Office of the Secretary of Defense, the Joint Staff and at Joint Forces Command. While any positive credit for ideas contained in this paper should be shared liberally among the aforementioned individuals, any substantive, grammatical or clerical errors are solely the responsibility of the author.

## Part 1

# Introduction

*Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur.*

Air Marshall Guilio Douhet

Air Marshall Douhet articulates the need for constant innovation to maintain military superiority *vis a vis* a foe. Examples throughout history are plentiful. Outnumbered three to one, English forces under King Edward III crushed pursuing French forces at the Battle of Crecy in 1346. The key to their success was the tactically savvy introduction of the longbow, enabling English archers to launch arrows nearly twice as far and at a more rapid rate than their crossbow-armed opponents.[1] Nearly six centuries later, Nazi forces combined dive-bombers and tanks to mount a blitzkrieg campaign that rapidly dominated its continental European neighbors.

When studying past conflicts, the military refers to "lessons learned." Unfortunately, sometimes the wrong lessons are learned, or the lessons are simply ignored. For instance, a misguided extrapolation of the lessons of World War I led the French to base their defensive strategy on a heavily fortified Maginot Line. Yet technological advances in armored vehicles and attack aircraft completely altered battlefield dynamics between World War I and World War II. While hindsight makes it easy to critique such errors, foresight is much less revealing.

Defense planners, while studying lessons from DESERT STORM in Iraq, RESTORE HOPE in Somalia, and most recently ALLIED FORCE in Kosovo, have to be careful not to fall into the trap of preparing for the last war. At least two factors complicate the job

of defense planners in contrast to their counterparts in business. First, feedback on new products or concepts occurs far less frequently. Despite advances in computer modeling and the military's tradition of field exercises, combat provides the only true test for new concepts and weapons. In contrast, free-market forces sort out winners and losers fairly efficiently in the commercial world. Second, the risks of being wrong are far greater when the stakes are life and death in support of vital national interests. Therefore, defense planners must hedge their bets by retaining some overlap in capabilities to meet threats of unexpected size or duration, and at the same time invest in a broad array of capabilities to counter a variety of unanticipated threats.

This paper will argue that vigorous implementation of evolutionary changes to the military requirements process is essential for the American military to transform itself to meet national security requirements in the 21st Century. The first section of the paper explores some of the factors that will shape transformation activities—from emerging threats to parochial service interests. The next section uses a generic view of generating, validating, integrating, and prioritizing military requirements to endorse recent defense planning initiatives that increase the roles of the Joint Requirements Oversight Council (JROC) and Joint Forces Command (JFCOM) in the military requirements process. The third main section briefly considers the merits of more radical reforms that would strip requirements functions away from the services. The paper concludes with recommendations that build on recent JROC and JFCOM initiatives to enhance decision-making in the requirements process.

## Part 2

# Factors That Shape Planning Decisions

> *. . .those of us on Capitol Hill are presented with a range of competing approaches to future warfare. Some advocate precision strike by airpower and others argue for decisive landpower while still others favor rapid dominance that destroys an enemy's will to resist. The list goes on and on. The problem is that each approach requires a radically different investment policy, organizational structure, and doctrine. How can Congress determine which of these various approaches is best suited for the battlefield of the next century. . .without a coherent process on which to base such critical decisions, the Pentagon is likely to default in favor of bureaucratic processes which stifle change.*
>
> U.S. Senator Dan Coats[2]

### Threat

The U.S. National Security Strategy calls for the capability to "rapidly defeat initial enemy advances. . .in two theaters in close succession," "fight and win under conditions where an adversary may use asymmetric means against us," and "transition to fighting major theater wars from a posture of global engagement—from substantial levels of peacetime engagement overseas as well as multiple concurrent smaller-scale contingency operations."[3] To build and maintain forces to meet this task, defense planners begin with a determination of the threat. During the Cold War, the Soviet Union dominated U.S. defense planning considerations. Today, the absence of such a clearly defined threat has led many to shift their focus away from defense issues. Yet instabilities in the international arena, coupled with the growing availability of weapons of mass destruction—those that can cause widespread devastation in small quantities—provide ample cause for concern. Add to this the potential emergence of a so-called peer

competitor—in the form of a resurgent Russia or expansionist China—and the potential list of threats becomes quite varied.

## Technological Change

As the pace of technological change continues to accelerate, predicting the types and composition of military forces needed to ensure future American security interests is even more complex. Certainly, emerging technology offers new advantages for U.S. forces. At the same time, the military establishment has become more a consumer than a producer of technological breakthroughs. Consequently, other militaries--or even non-state "bad" actors--may be able to purchase off-the-shelf technologies to challenge U.S. technological superiority through asymmetric means such as cyber attack or biological warfare, and even directly through weapons such as smart sea mines and surface-to-air missiles. Commercially available satellite imagery has already diminished the opportunities to maintain the type of surprise U.S. ground forces enjoyed during their sweeping left-hook of Operation DESERT STORM.

## Price of Global Engagement

The unprecedented operating tempo for American forces maintaining the peace around the globe during the last decade is causing military hardware to wear out much sooner than expected. This poses a dilemma for military planners. In the short term, they must maintain, upgrade, and replace an aging force structure to remain responsive to the requirements laid out in the National Security Strategy.

Over the long term, they must transform American military forces by exploiting the daily breakthroughs in information and communication technologies to achieve the potential for seamless information sharing and command and control among the forces of

all four military services. Yet full funding of both paths is not an affordable option—earlier trade-off decisions among competing concepts—both in legacy systems and new initiatives—offers a the only affordable path to the future.

## Institutional Filters

The four military services are at the same time a primary source of innovation but a hindrance to integration. Individual military Services, as part of their Title 10 responsibilities, "organize, train, and equip" the building blocks which become warfighting tools for the Unified Commanders-in-Chief (CINCs) to employ to accomplish their mission. They accomplish this through unique core competencies based upon culture and tradition emanating from their experiences in conducting warfare in and from their respective environments—land, sea, and air. The case of theater missile defense provides an excellent illustration of how each military department approaches a "problem" from different perspectives.

The Army, since the days of WWI, rightly considered defense of its troops from air attack to be a priority. Therefore, ground commanders argued for stationing defensive air patrols over their troops, providing visual reassurance for those on the ground that they had air cover.[4] Furthermore, in ground combat, conventional wisdom has held that it takes a 3 to 1 advantage to succeed in an attack—defense was thus a stronger form of warfare. Additionally, as technology allowed development of accurate air defense artillery and later, surface-to-air missiles, these defensive weapons became organic to maneuver units. Not surprising, then, that a "point defense" approach based on surface-to-air missiles would be the Army's initial entry for theater missile defense.

In contrast, airmen have learned that a good offense beats a good defense any day. In other words, it is much easier to defeat an opponent's air force on the ground by destroying his aircraft, runways and supporting logistics. While this has proven to be the most efficient way of ensuring air superiority, it did not necessarily prevent a few "leakers" from getting through. Thus, the wisdom of a layered approach to air superiority—the Air Force conducts offensive counter air operations against enemy airfields and logistics facilities, and engages enemy aircraft over the enemy's own territory to take the fight to the enemy.

Ground forces provide the final line of defense through surface-based area and point defense systems. As a service born of technology, the Air Force has applied the same logic of layering by seeking a technology that would permit a theater missile defense equivalent to offensive counter air. Current initiatives range from sensor-to-shooter networks to target mobile missile launchers in real time, to the revolutionary concept of an airborne laser to kill theater ballistic missiles shortly after launch during the boost phase, ensuring debris falls back on an opponents territory.

Complementing both the ground and air approach, the Navy has historically exploited the fact that seventy percent of the earth's surface is covered by water to offer the nation innovative solutions to thorny national security issues. In the case of theater missile defense, they've harnessed the ready availability of ships with missile launch capability and state-of-the-art "network-centric warfare" initiatives to offer a wide area missile defense capability in littoral areas—which they quickly point out constitutes the majority of the world's population. As it happens, this forms a middle defensive layer between boost-phase intercept and terminal area defense.

In the case of theater missile defense, the various service approaches complement one another. The difficulty comes when paying the bill—not all of these initiatives are affordable simultaneously. Organizational tension results from two opposing but equally valid factors in shaping military capabilities to respond to an uncertain future. The imperative to apply new technologies to seek an advantage over potential foes demands constant innovation. In the military, just as in the business world, competition and decentralization spur innovation. The four separate military services provide both as they compete for their perceived fair share of the defense budget, creating a marketplace for new ideas, concepts, and weapons systems.

Yet budget constraints set a practical limit on redundancy in Service capabilities and require tough trade-off decisions. Furthermore, the creative integration of air, land, and sea forces offers potential synergies not necessarily available to forces operating in a single medium. As an example, a potential foe might concentrate to achieve superiority against U.S. ground forces, but this concentration provides a lucrative target for air attack. Similarly, if the hostile force chose to disperse to enhance survivability against attack from the air, it would leave itself vulnerable to piecemeal defeat by U.S. ground forces. Both the need to make trade-offs among Service capabilities, while at the same time ensuring their interoperability, reinforces the need for a healthy dose of centralized planning to successfully transform military capabilities.

The next section will provide the foundation for recommendations to enhance the quality and timeliness of "top-down" guidance—the greater dose of centralized planning—while preserving sufficient service autonomy to fuel innovation and motivate individual soldiers, sailors, marines, and airmen.

## Part 3

# An Evolutionary Approach to Transformation

> *The area of joint requirements comes into play only from the point of view that it doesn't do any good to go out and review training, or to come up with training regimes, or to look at doctrine or organizational matters and come up with conclusions, or to experiment with future capabilities, unless you can somehow make the changes take place. And the way you make the changes take place is by entering into the requirements process.*
>
> Admiral Harold "Hal" Gehman, CINCJFCOM[5]

At the heart of the military's transformation is the requirements process, shaping the investment decisions that apportion the defense budget among the military services, defense agencies, and unified commands. Recent initiatives bring badly needed improvements to a process that has been rightly criticized for insufficient rigor and leadership. New mandates for the JROC[6] change its focus from merely approving service-initiated individual weapons system proposals to driving architecture development and requirements integration for all forces. As such, it will become the Chairman's primary agent for exercising his Title 10 requirement to advance joint warfighting. Additionally, JFCOM's charter to conduct joint experimentation creates as environment where JFCOM can leverage ongoing service experimentation efforts and gain insights into new joint requirements that will better integrate the forces of each service.

While it is too early to assess the long term impact of these positive changes, momentum toward transformation could yet stall due to parochial service interests, partisan or pork barrel politics, or bureaucratic infighting within the Defense Department. This section will encourage a vigorous, yet evolutionary, transformation of the American

military to face the challenges of the 21st century by endorsing strengths in requirements process as it is currently evolving, and offering a few suggestions for improvement. Discussion will focus on the following basic elements of the military requirements process:

- Generate and validate requirements: develop and approve concepts and specific proposals to address deficiencies in capability, replace or upgrade aging systems, or take advantage of emerging technologies
- Integrate requirements: ensure interoperability of related architectures and optimum supportability through commonality of design
- Make tradeoff decisions: test and analyze competing requirements, ensure individual systems meet design specifications, assess joint value-added when individual systems operate as part of a "system of systems"

## Generate And Validate Requirements

Ideas for new military systems have traditionally come from the individual military services, sparked by specialized expertise in their primary mediums of warfare. The previous section illustrated how core competencies[7] lead to differences of opinion among the services regarding the nature of future threats and how to best respond. The ensuing inter-service rivalry has generally produced healthy competition[8] that resulted in innovative technological breakthroughs. As an example, in 1955 the Air Force share of over 46 percent[9] of the entire defense budget helped inspire the Navy to develop a way to launch ballistic missiles from submarines.[10] The result was an extremely powerful nuclear deterrent—the "triad" of bombers, land-based ballistic missiles, and submarine-launched ballistic missiles.

While the majority of new ideas still begin within the Services, other organizations are playing an increasingly prominent role. The staffs of the Secretary of Defense and the Joint Chiefs of Staff, responding to inputs from unified commanders and exercising their own unique top-down perspective, identify requirements that may not fall within the unique core competencies of any particular service. JFCOM's joint experimentation efforts will also generate new requirements. Finally, defense agencies, especially those with combat support roles, develop military requirements in areas such as logistics, intelligence, communications, and missile defense.

Unique among defense agencies is the Defense Advanced Research Projects Agency (DARPA)[11]. It has the specific charter to work closely with the services, industry and academia to identify and help field new militarily useful technologies. Industry's contributions to innovation are exemplified by Lockheed's famous "Skunk Works,"[12] creating a legacy of technological breakthroughs in aviation, including the first operational U.S. jet fighter—the P-80, two highly advanced surveillance aircraft—the U-2 and the SR-71, and the first stealth fighter—the F-117. A more recent approach to capture innovation is the Advanced Concepts Technology Demonstration (ACTD) program. Rather than waiting for operational lessons to generate mission needs statements and operational requirements, this program looks outside DOD and into the future for enabling technologies. Successes include the Global Hawk high altitude unmanned aerial vehicle with long-dwell capability for expanded surveillance and reconnaissance, and a data fusion ACTD to produce a single integrated air picture.[13]

One of the difficulties in adapting new technologies for military use is the rigidity inherent in requirements documentation. To increase flexibility to update current

programs with emerging technologies, greater use of time-phased requirements and incorporation of cost as an independent variable enable better technological risk assessments and cost/performance decisions. The Defense Department is moving forward with these and related initiatives.[14]

New system proposals require validation prior to becoming actual programs. The JROC plays the central role in program validation. The Vice Chairman of the Joint Chiefs of Staff chairs the JROC, whose members are the Vice Chiefs of the four services. Since its inception in 1986, the JROC has functioned as a clearinghouse to approve service proposals for new or replacement equipment. The formation of the Joint Warfighting Capabilities Assessment (JWCA) structure in 1994 provided "analytically based insights designed to stimulate and inform discussions among the four-star JROC members."[15] The recent announcement of JROC intent to "effect the requirements process at the front end" and expand the duties of its assessment teams will raise the bar for program validation.[16]

In reality, initial validation by the JROC has not been a difficult hurdle to cross because the JROC lacked enough objective and rigorous analysis capability to show compelling cause to cancel a program over the objections of the sponsoring service and any associated political supporters. In part this was due to the lack of sufficiently detailed overarching guidance to set standards and direct service investments in future capabilities. In fact, the 1999 Defense Science Board Report on Warfighting Transformation criticized the Defense Department for a lack of a transformation roadmap. Broad direction does exist in the form of strategy documents, joint vision publications, and program guidance. Yet a coherent link between these high-level

documents and the specific service proposals for new programs is not always evident. Until recently, the Office of the Secretary of Defense and the Joint Staff acted to create a roadmap "after the fact" by cobbling together independently generated service proposals for new programs. The JROC's unique credibility, experience and authority make it an ideal body to ensure service requirements and future architectures center on advanced joint warfighting needs. The JROC, supported by its assessment teams and JFCOM's joint experimentation, will enable the Joint Staff to impact the front-end of the requirements process, prior to the Services investing so heavily that they become too resistant to change.

A related shortfall has been the lack of advocacy for inherently joint systems. Prior to the establishment of JFCOM, no organization had the specific task to develop and champion joint requirements. In effect, services designed systems first for their own needs, with joint requirements a secondary consideration. Yet certain capabilities benefit many customers, and either do not fall neatly into a single service's core competency or cross several services' core competencies. While no single list of inherently joint requirements exists, some examples might include command and control, theater air and missile defense, combat identification, and logistics.[17] The Defense Science Board's recommendation that the Defense Department needs a greater capacity for systems architecture and systems engineering in order to develop and ultimately field "born joint" capabilities[18] is right on the mark. A single organization needs the undisputed authority and resources to develop, test, and establish detailed guidance for systems architectures. Given JFCOM's new charter and growing joint experimentation mission, JFCOM would be the logical host of this new organization, with a direct link to the Assistant Secretary

of Defense for Command, Control, Communications and Intelligence, the intelligence community, and other information intensive organizations.

### Integrate Requirements

Integration efforts must begin prior to program validation—trying to force interoperability on separate systems after the fact is expensive and often not feasible. The JROC has already taken a major step forward by establishing requirements oversight through the Capstone requirement process.[19] The Capstone concept establishes integration and interoperability requirements for families of systems, providing overarching guidance to define standards for related programs. Informal coordination among services is also critical. While separate requirement generation organizations within each service may foster innovation, they do not facilitate early multi-service collaboration. Technology may help ameliorate this situation, as the Office of the Secretary of Defense, the Joint Staff, and the Services are developing automated data sharing systems in two phases. The first will be an automated requirements document tracker for formal requirement documents, and the second will be an integrated requirements coordination system.[20] To extend this integration into operations, there is merit in examining concepts for a joint interoperability training center that might sit as a superimposed organization binding the service warfare centers together.[21]

The JROC's influence as the Chairman's primary agent to establish architectures and standards will continue to grow. Joint Vision 2020 emphasizes the importance of interoperability across not just service lines, but also among allies and governmental agencies.[22] A shift in intellectual capital will facilitate this increased influence, as the JROC's assessment teams will migrate from working close-in, narrowly focused issues,

to directly supporting the JROC in comprehending broad, far-reaching joint warfighting requirement challenges. Already, new assessment teams focused on interoperability, combat identification, and reform reflect this broader emphasis. As the first step to enforce emerging standards, the Joint Staff has made information interoperability a key performance parameter for future operational requirements.[23]

Joint experimentation and robust assessments will provide critical data required for determining specific interoperability standards. Details such as data rates, acceptable error rates, timeliness, format, bandwidth, and criticality are just several information related interoperability measures. Traditional logistics interoperability concerns include fuels, lubricants, support equipment, and cargo limitations. Now, however, logistics interoperability has expanded to encompass other areas such as automated inventory tracking through a variety of optical and radio frequency methods.

A key to ensuring architectures reflect the needs of the ultimate customers is the active involvement of JFCOM in the process. As a beginning, the JFCOM Commander's increasing involvement in the JROC and Defense Acquisition Board (DAB) has already given him *de facto* veto power for issues of interoperability.[24] As a result, program managers may actually seek an "out of court settlement" with JFCOM prior to formal presentation to the JROC or DAB.[25] Continued involvement by JFCOM in these proceedings will ensure the results of joint experimentation help drive integration requirements. Additionally, continued use of Senior Warfighting Forums to obtain direct input from Unified Commanders will enhance the information available to senior decision-makers.

JFCOM experimentation in the Defense Agency-dominated joint command and control domain is critical to maintaining Information Superiority.[26] In an era when forces of globalization make advanced technology available to friend and foe alike,[27] JFCOM's experimentation should encompass tactical applications of advanced technology and organizational structures throughout the Department of Defense. Vast intelligence, surveillance, and reconnaissance (ISR) capabilities reside in a variety of defense programs, both within and outside the National Foreign Intelligence Program (NFIP). Yet achieving a fully networked ISR architecture within the Defense Department is problematic due to the NFIP's funding process, shared by the Secretary of Defense and the Director of Central Intelligence, that does not subject all NFIP programs to the rigorous information exchange requirements of Service programs.[28] Total force transformation requires families of systems to be built in overarching strategic architectures. Establishment of information exchange prerequisites for all Defense-related ISR platforms and their dissemination paths would better leveraging of national and tactical capabilities.

Yet several obstacles remain for effective integration. Traditional stovepipes and institutional vested interests may balk at new enforcement mandates given to the JROC and the growing role of JFCOM in requirements decisions. Acceptance of any transition plan to upgrade legacy systems to meet new interoperability standards will depend on availability of additional funds. JFCOM's effectiveness will be tied directly to the quality of analysis and experimental results that support JFCOM recommendations, as well as the personal credibility of the JFCOM Commander-in-Chief (CINC). Thus, strong consideration of qualifications and prior experience for the job of CINCJFCOM

will be essential for CINCJFCOM to exert influence with policy makers in Washington, service Chiefs, and other CINCs. Similar consideration should apply to selection of the Deputy CINCJFCOM, to include consideration of upgrading this position to a four-star billet.

**Make Trade-Off Decisions**

Within the strategic lane carved out for modernization, a range of technology-dependent decision possibilities exists from minor incremental improvements through major quantum leaps. Incremental changes might be same-system upgrades in engines, armament or electronics. The Navy's series of avionics upgrades have kept the aging EP-3E as a viable contributor to the electronic reconnaissance mission. Similarly, incremental change may occur through replacement of one system with another that performs the same basic mission in the same manner, but more effectively. The Army's upgrade from the M-60 to the M1 tank is a prime example. Often, these incremental upgrades come more as a result of the need to recapitalize worn-out equipment than from a threat-driven need for major improvement.

Quantum leap improvements occur as a result of a combination of emerging technologies and new employment concepts. These advances may be dominated by a single technology, such as the introduction of jet aircraft or the Air Force's current Airborne Laser program, or may result from the synergy of multiple new technologies and operational concepts, such as the German blitzkrieg. Furthermore, revolutionary advances may force the sunset of some legacy systems or even fundamental operational concepts. The ascendancy of carrier aviation in the Navy and Marine Corps demonstrates both. With commercial innovation outpacing the military, future major advances may

depend more upon a rapid adaptation and creative combinations of commercial technologies than on a single technological breakthrough.

Several factors shape trade-off decisions. The degree of interdependence expected among components from different service is a prime consideration. Navy and Air Force sharing of the EA-6B for electronic jamming is an innovative solution that requires increased interdependence among the services. Joint experimentation should offer an unprecedented opportunity to develop and concept new concepts for cross-service battlefield support, while validating the need for various independent force elements. The Kosovo campaign demonstrated the utility of an air-heavy task force for some scenarios, but did not fit the traditional doctrinal mode of having Army forces deployed in force to pressure hostile ground forces and provide rear-area protection. Attachment of an Army brigade to an Air Expeditionary Force to form a joint expeditionary force would make an excellent joint experiment. Fruits from such experimentation might reveal how to best use Army aviation in an air campaign when ground forces are not directly in contact, or provide opportunities to reduce the high operating tempo of the Air Force's ground security elements.

Joint experimentation will positively impact another factor inherent in trade-off decisions: assessment of technological risk. JFCOM's joint experimentation efforts can leverage service efforts to provide a rich environment for testing the performance and interaction of various joint and service initiatives and prototypes. However, joint experimentation is not a panacea. Rigorous analytic assessments will also provide insights into future force requirements. The intellectual capital of Joint Staff and OSD analysis teams provides a joint foundation for service initiatives to build on. Yet analysis

is not without its difficulties—traditional analytical tools have been unable to accurately forecast interactions and synergies of "systems of systems" or "effects-based targeting."[29] Simple metrics such as numbers of tanks destroyed are of limited value in predicting the future value of network-centric warfare, non-lethal weapons, or stealthy aircraft. Increased investment in the scientific and analytical capacity to understand and model the unprecedented complexity that will attend new capabilities and operations is essential.[30]

The combination of JFCOM's joint experimental data and independent analysis from within OSD, the Joint Staff, the Services, and some Defense Agencies, will further illuminate the debate over defense spending priorities during the annual budget cycle. But joint experimentation is still in its infancy, and a significant amount of "front-end intellectual work" in JFCOM's J9 Directorate was needed to jump-start the joint experimentation process. With this firm foundation, additional experimentation resources would now accelerate progress. As JFCOM's joint experimentation expertise matures, the Defense Department and Congress should be prepared to offer additional resources for initiatives such as establishment of a standing joint experimentation joint task force headquarters and expansion of JFCOM's analysis and testing capabilities.

More than just resources, though, JFCOM needs a free hand to pursue a balanced program across the range of near, mid, and far-term experiments. This will require strong support not just from JFCOM's Service components, but from other functional and regional commands, and defense agencies. They also need freedom to conduct experiments that fail—we often learn more from actions that don't work than from those that do.

Trade-off decisions are inconsistent at best when made outside of the context of an overarching strategic transformation roadmap. Robust analytic assessments and actual experimentation not only demonstrate the degree to which new proposals contribute to transformation, but also assist senior leaders as they refine the roadmap for strategic modernization. The context for such a roadmap has to be a projection of the threat against anticipated national security interests. While illustrative scenario planning can facilitate innovation, each service c an artfully create convincing scenarios that justify increased spending on their behalf. With little hard analytic or experimental data, relative budget shares among the services vary little from year to year. Trade-off decisions require comparison of accurate real-world intelligence assessments with projected national security interests to determine priorities among competing programs. One might expect greater variance among service budget shares as they develop methods for countering the projected threat more effectively.

## Part 4

# Consideration of Radical Reforms

*The identification of military requirements should be consolidated in a Joint Requirements Committee, chaired by the Secretary or Deputy Secretary of Defense, with the Chairman (or his designated representative, perhaps the Vice Chairman) serving as the senior military member and deputy chairman. Membership should be restricted to the service chiefs or vice chiefs and four senior civilian members from the Office of the Secretary. The committee would be responsible for setting all military requirements. . .*

Admiral William A. Owens[31]

The appropriate balance between innovation—primarily generated by the specialized expertise resident in each of the four services—and integration of the efforts of the services, will continue to be a topic of considerable debate. Prior to World War II, the balance favored separate service operations. Since that time, Congress has used legislation such as the National Security Act of 1947, the Defense Reform Act of 1956 and the Goldwater-Nichols Act of 1986 to shift the balance increasingly toward joint operations—both in defense investment decisions and actual force employment.

The penalties for shifting the balance too far in either direction are severe. The defense budget simply will not support all the initiatives put forward by each of the four services, and the nation expands its military options in time of crisis by ensuring the forces of each of the four services can train and fight together effectively. Similarly, any proposals to create additional Major Force Programs—for space, information, or logistics, as examples—would build additional stovepipes at a time when the need is to better integrate service, CINC, and defense agency efforts. Thus, some degree of centralized direction to integrate the forces of each service—both at the national level and in the field—is beneficial. In contrast, over-centralization of decision-making for

investments and operations, while producing process-efficiencies on paper, risk the consequences of being wrong. As retired Marine Corps Lieutenant General Bernard Trainor observes, " . . .if for its sake conformity is achieved at the expense of uniqueness. . .we could end up with a military that is inflexible, uncreative, and most importantly, predictable."[32]

When the stakes are American lives, this risk is high indeed. Thus, proposals which rob the Services of their separate budget authority and organizational resources for generating future military requirements would undoubtedly hinder innovation and limit the overall range of options available to command authorities in time of crisis. Nevertheless, the warning of former Vice Chairman of the Joint Chiefs of Staff, Admiral William Owens, sounds an alarm for action. He believes it is already too late to recapitalize the current force, and thus advocates radical reform to reshape defense investments to achieve a successful transformation of the military.[33]

Granted, an endorsement of the present "evolutionary" approach makes for less interesting reading than radical approaches, but Michael O'Hanlon of the Brookings Institution reminds us that

> The "status quo" in defense circles does not mean standing still; it means taking a balanced approach to modernization that has served the country remarkably well for decades--and indeed brought on the very technologies displayed in Desert Storm that have given rise to the belief that an RMA may be underway.[34]

General innovation theories also support the current evolutionary approach. In their widely read book *Competing for the Future*, Gary Hamel and C.K. Prahalad observe

"Getting to the future is a process of successive approximation," and that "too many companies, driven by an initial burst of enthusiasm, take a giant leap into the unknown and find themselves hurtling over a cliff."[35]

Thus, if the evolutionary approach offers the best route to transformation, defense planners should focus on fueling the engines that take us there. A RAND study on transformation finds that once Joint Force Command grows to fill the shoes given to it, most of the "needed transformation can occur with business-as-usual activities of the services."[36] Senator Lieberman also observed, "Joint Forces Command has not yet conducted its first experiment."[37] Thus, one of the most important commodities JFCOM needs is time to develop expertise in joint experimentation and expand the spiral development process. Fortunately, the recent proactive stance adopted by the JROC will provide an ideal conduit for JFCOM's experimental results and recommendations to have a direct impact on investment decisions.

## Part 5

# Recommendations

*Because transformation involves creating the capability for large complex operations, supported by large and complex systems of systems, success will require far more than good top-level documents, some joint doctrine, and the loose coordination of Service efforts*

RAND Transformation Study[38]

- The JROC should grow in its role as the Chairman's primary agent to exercise his Title 10 responsibility to advance joint warfighting by shifting its focus from approval of service-initiated systems to providing front-end guidance for requirements integration and architecture development. The Chairman's annual published guidance to the JROC will provide an opportunity to proactively shape the total force by providing broad guidance to the JROC to assist them in linking specific integration and architecture decisions to the overall joint warfighting vision.
- Integrate JFCOM's joint experimentation efforts fully into the JROC and other defense decision-making processes. Robust experimental data, when combined with emerging analysis and assessment tools, will provide decision-makers with better insights to establish integration requirements and make trade-off decisions. On-going senior JFCOM representation in these decision-making processes will enhance the impact of experimental results on key decisions.
- As the emerging "futures" CINC, the commander and deputy commander of JFCOM will need a special mix of expertise and experience to be fully successful—their personal credibility will directly impact the amount of influence they have in JROC

and related deliberations. Their responsibilities range from training component forces in joint operations, integrating doctrine and operational concepts for all services, providing ready joint force packages to other CINCs, and conducting joint experimentation for the Chairman. Prior service as a Unified Commander or Deputy, or Service Vice Chief of Staff are examples of duties that would truly establish senior JFCOM leaders as first among equals.

- Accelerate and fund joint and service experimentation, and expand investments in analytical tools capable of providing insights on the synergies inherent in modern warfare. While JFCOM should remain the Chairman's lead agent for experimentation, participation from the Services, CINCs, and government and defense agencies in joint experimentation is critical to achieving results that reflect the full range of tools available to joint commanders in time of crisis.

## Part 6

# Conclusion

*The true vision of Goldwater-Nichols will not be fulfilled until we have effective cooperation not just in operations, but in the way we prepare for and support those operations.*

John White, former Deputy Secretary of Defense[39]

This paper focuses on improving the operational effectiveness of the U.S. military forces as they transform to meet emerging challenges. The heart of transformation is the decision making process to guide development of doctrine and investment in future force structure. The Chairman needs a stronger role to articulate a template for new capabilities so that Service forces become more capable of unified military action whether training, rapidly responding to the latest crisis, or operating overseas. The Chairman's joint vision provides a basis for that template, but the details will require robust joint experimentation under the Joint Forces Command and overarching guidance for integration and architecture development from the Joint Requirements Oversight Council.

Endorsement of greater authority for JFCOM and a more proactive role for the JROC is not a call for a "cookie-cutter" approach to force building. The essence of jointness is not a one-size-fits-all purple solution for all circumstances. Rather, it is the artful blending of diverse military capabilities at the right place and time to ensure a decisive outcome for U.S. forces. The optimum mix in a given scenario may depend more heavily on one service's forces more than others. In the past decade scenarios have included air occupation and coercion, naval interdiction, peace enforcement and peacekeeping, humanitarian relief, and a major theater war involving all the services. This is why an

increased emphasis on joint experimentation—to test a wide array of force employment combinations—is crucial to gain insights for future force structure investments. The optimum kinds and proportions of forces will vary with each new situation.

The recommendations of this paper are evolutionary since the Department of Defense must transform while continuing to operate. Historically, American forces have shown a tremendous capacity to adapt and cooperate in the heat of combat. Vigorous evolutionary change will require them to achieve similar unity of effort in shaping the nation's future force structure. The military's effort alone will not be enough. The increasing overlap of military and civilian national security issues necessitates an unprecedented level of coordination between the Defense Department and other governmental and non-governmental agencies. Finally, transformation will not succeed if it is viewed solely through the lens of the annual budget cycle or even the future years' defense plan. Greater collaboration between the Defense Department and Congress can produce consensus for long-term direction and foster stability in the core programs that fuel transformation.

## Notes

[1] R. Ernst Dupuy and Trevor N. Dupuy, *The Encyclopedia of Military History*, 2d Edition, (New York: Harper and Row, 1985), 355.
[2] Dan Coats, "Joint Experimentation—Unlocking the Promise of the Future," *Joint Force Quaterly,* Autumn/Winter 1997/98, 13.
[3] The White House, *A National Security Strategy for a New Century*, (Washington, DC: Government Printing Office, December 1999), 19.
[4] Andrew Boyle, *Trenchard* (New York: W. W. Norton & Company, 1962), 170.
[5] Glenn W. Goodman, Jr., "Chief Advocate for Jointness," *Armed Forces Journal International*, December 1999, 32.
[6] Frank Wolfe, "Myers: Pentagon Needs JROC Influence Up Front," *Defense Daily*, April 5, 2000, 7.
[7] Gary Hamel and C.K. Prahalad, *Competing For The Future,* (Boston: Harvard Business School Press, 1996), 34. Excellent discussion of core competencies.
[8] As noted by the Center for Strategic and International Studies (CSIS) study of service culture, while "a competition for resources and missions often produces unproductive rivalries. . . the competition among the services in terms of doctrine, training, and acquisition has proven healthy." This study emphasizes the need for balance, however: "the challenge confronting the services is to continue to foster distinct, vibrant service cultures, at the same time improving the services' capacity for effective joint operations." "American Military Culture in the Twenty-First Century," *CSIS Report*, Executive Summary, 7, on-line, Internet, February 2000, available from http://www.csis.org/pubs/am21exec.html.
[9] Office Of The Under Secretary Of Defense (Comptroller), *National Defense Budget Estimates For FY 2001*, Table 6-3, 74, on-line, Internet, March 2000, available from http://www.dtic.mil/comptroller/fy2001budget/fy2001grbk.pdf.
[10] The U.S. Navy set up a Special Projects Office (SPO) in 1955 to guide development of the submarine-launched Polaris missile; they succeeded in deploying the missile by 1960, forming the final leg of the nuclear triad. John P. Cornett et al, "Acquisition Revolution," Research Paper, (Maxwell AFB: Air Command and Staff College, April 1996), 33.
[11] The Russian Launch of Sputnik in 1958 served as a wake up call to American government and industry alike. In response President Eisenhower formed the Advanced Research Projects Agency (ARPA) to cut through government bureaucratic processes and facilitate great leaps forward. A few of the dividends from that decision are the internet, stealth aircraft, advanced radars and cruise missiles. Margaret Bone, "The Future of Warfare," *The Retired Officer Magazine*, January 2000, 67.
[12] Cornett et al, 27
[13] Spawned from the 1986 Packard Commission, created in 1995 as a program managed directly within the Office of the Secretary of Defense, the ACTD program contributes most to capabilities essential to achieving Information Superiority, an indispensable foundation of Joint Vision 2010. Rather than waiting for operational lessons to generate mission needs statements and operational requirements, the ACTD program looks outside DOD and into the future for enabling technologies.

[14] Responding to language in the 1998 National Defense Authorization Act, DoD submitted the 912C Report on acquisition streamlining and related initiatives. Two initiatives aimed at fostering innovation in the requirement process: incorporation of cost as an independent variable (CAIV), and a commitment to introduce time-phased requirements. Inclusion of CAIV in an operational requirement document (ORD) increases flexibility to make cost/performance trades when dealing with the risks inherent in new technologies. The use of time-phased requirements in an ORD has a similar effect by increasing opportunities to update technologies within a program during the actual development process.

[15] William A. Owens and James R. Blaker, "Overseeing Cross-Service Trade Offs," *Joint Force Quarterly*, Autumn 1996, 38

[16] Wolfe, 7.

[17] Harold W. Gehman, "What Kind of Transformation Do You Want" *Proceedings*, February 2000, online, Internet, February 4, 2000, available from http://www.usni.org/Proceedings/Articles00/PROgehman.htm. Also see Coats, 13: "Today we have a different set of innovations—Internet data transfer, stealth, precision munitions, space-based communications, and others. The true advances in operational concepts enabled by this technology are likely to be joint and may not be fully appreciated as yet. Consequently, the transformation from post-Cold War to information age capabilities cannot be relegated to decentralized service prerogatives. Rather, it is a joint challenge to be resolved with joint processes that drive decision making."

[18] Department of Defense, *Defense Science Board Report on Warfighting Transformation*, (Washington, DC: Office for the Under Secretary of Defense for Acquisition and Technology, September 1999), 25.

[19] A Capstone Requirements Document (CRD) provides overarching guidance for subordinate Operational Requirement Documents (ORDs) of individual programs. This was in response to criticism in DoD 912C Report to Congress: "ORDs tend to be system specific and do not address interoperability within the same joint mission area." Department of Defense, Section 912C Requirements and Acquisition Study Working Group, *Section 912C Report: Requirements and Acquisition*, ES-3.

[20] *Section 912C Report: Requirements and Acquisition*, June 1999, ES-4 and Jacques S. Gansler and Joseph W. Ralston, Memorandum titled "Implementing Requirements Generation and Acquisition Policy," July 14, 1999.

[21] Response from Joint Forces Command Staff to questions submitted via e-mail, March 2000.

[22] US Joint Chiefs of Staff, *Joint Vision 2020*, (Washington, DC: Government Printing Office, June 2000), 32.

[23] Jacques S. Gansler and Joseph W. Ralston, Memorandum.

[24] Interview with CAPT John Waickwicz, USN, Joint Chiefs of Staff, December 13, 1999.

[25] Goodman, *Armed Forces Journal International*, 32.

[26] Information Superiority, as described in Joint Vision 2020, is key enabler of strategic force structure documents, and by extension, an assumption in future war plans.

Information Superiority is the heart of the Revolution of Military Affairs, upon which we rely to overcome the vulnerabilities of an aging force structure in the resource-constrained environment.

[27] Department of Defense, *Defense Science Board Task Force on Globalization and Security*, December 1999.

[28] A detailed explanation of intelligence resource management is provided by the Joint Military Intelligence Training Center in "An Intelligence Resource Manager's Guide" (1997 Edition, 4th Printing) dated July 1999. In the front matter, former Director of Central Intelligence John Deutch and former Deputy Secretary of Defense John White are quoted from their 7 June 1996 joint statement from the cover memo to the Joint Intelligence Guidance for Fiscal Years 1998-2003: "Only through more open and effective integration of intelligence disciplines and organizations can U.S. Intelligence meet the challenges we face and provide the same high level of support to our customers." While coordination exists between the SECDEF and the Director of Central Intelligence (DCI), National Foreign Intelligence Program (NFIP) managers use the DCI's Capabilities Programming and Budgeting System (CPBS) to produce funding requests for NFIP program elements executed within and outside the Department of Defense. To fully satisfy warfighting requirements, the SECDEF has found it necessary to create a Joint Military Intelligence Program (JMIP), managed within the SECDEF's Planning, Programming, and Budgeting System (PPBS) to augment NFIP programs executed by DOD. Recent creation of information exchange requirements to define and enforce information interoperability key performance parameters demonstrates a general need to prioritize information interoperability over raw ISR collection capability.

[29] See for example Booz-Allen & Hamilton Inc., "Measuring the Effects of Network-Centric Warfare," Volume I prepared for Office of Secretary of Defense Net Assessment, April 28,1999.

[30] Paul K. Davis, et al., *Transforming the Force: Suggestions for DoD Strategy*, RAND Issue Paper, 1998, 20. Provides several detailed suggestions for the type of exploratory analysis, modeiling and experimentation that would be useful from a joint force commander's perspective.

[31] William A. Owens, "Making the Joint Journey," *Joint Forces Quarterly*, Spring 1999, 92. This act would "strip out all other requirements bodies from the services and consolidate analytic resources in the new requirements committee staff" and "remove the requirement function from the services and charge them with implementing decisions of the Joint Requirements Committee."

[32] Bernard E. Trainor quoted in Frank Hoffman, "Innovation Can Be Messy," *Proceedings*, January 1998.

[33] In proclaiming the current system as broke, Admiral Owens points out that service budgets change by one percent or less from beginning to end of the annual budget process. Personal interview, Seattle Washington, February 15, 2000.

[34] Michael E. O'Hanlon, "Beware the 'RMA'nia!'" paper presented at National Defense University, September 9, 1998, 2.

[35] Hamel and Prahalad, 135.

[36] Paul K. Davis et al., 20.

[37] Joe Lieberman, "Transforming National Defense for the 21st Century," speech delivered to U.S. Army Conference on Strategic Responsiveness, November 2, 1999.
[38] Paul K. Davis et al, 19.
[39] John White, untitled remarks to American Defense Preparedness Association, December 19, 1996, online, Internet, February 2, 2000, available from http:/www.defenselink.mil/news/Dec1996/b122096_bt684-96.html.

## Bibliography


Adolph, Robert B. Jr, Stiles, Charles W., and Hite, Franklin D. Jr. "Why Goldwater-Nichols Didn't Go Far Enough" *Joint Forces Quarterly*. Spring 1995.

"American Military Culture in the Twenty-First Century," *CSIS Report*, Executive Summary. Washington, DC: Center for Security and International Studies. Online. Internet, February 2000. Available from http://www.csis.org/pubs/am21exec.html.

Augustine, Norman R. "Acquisition Reform: Dream or Mirage?" Speech to American Defense Preparedness Association Conference in Atlanta, GA. Online. Internet, January 27, 2000. Available from http://dacm.sarda.army.mil/publications/rda/sepoct96/indust.html.

Birkler, John et al. *An Acquisition Strategy, Process, and Organization for Innovative Systems.* RAND Report. Santa Monica, CA: RAND Corporation, 2000.

Bone, Margaret. "The Future of Warfare," *The Retired Officer Magazine*, January 2000.

Booz-Allen & Hamilton Inc., *Measuring the Effects of Network-Centric Warfare, Volume I.* Study prepared for Office of Secretary of Defense Net Assessment, April 28,1999.

Bourne, Christopher M. "Unintended Consequences of Goldwater-Nichols: The Effect on Civilian Control of the Military." *Essays on Strategy XIV*. Washington, DC: National Defense University Press, 1997.

Ceteras, Timothy et al. "Reengineering Defense Acquisition: A Concept of Operations for Waging the Acquisition Campaigns of the 21st Century." Research Paper. Maxwell AFB: Air Command and Staff College, May 1995.

Coats, Dan. "Joint Experimentation—Unlocking the Promise of the Future," *Joint Force Quarterly*. Autumn/Winter 1997/98.

Cohen, William. "DoD Role in 21st Century." Speech delivered at Fletcher Conference. November 3, 1999. Online. Internet, February 7, 2000. Available from http://www.usis.it/wireless/wf991103/99110318.htm.

Conley, Kathleen M. "Campaigning for Change: Organizational Processes, Governmental Politics, and the Revolution in Military Affairs." *Airpower Journal*. Fall 1998.

Cornett, John P. et al. "Acquisition Revolution." Research Paper. Maxwell AFB: Air Command and Staff College, April 1996.

Davis, Paul K., et al. *Transforming the Force: Suggestions for DoD Strategy.* RAND Issue Paper. Santa Monica, CA: RAND Corporation, 1998.

Department of Defense. "JROC/JWCA Process." Chairman of the Joint Chiefs of Staff J8 Executive Overview Briefing. December 1999.

Department of Defense. *Defense Science Board Task Force on Globalization and Security*. Washington, DC: Office of the Under Secretary of Defense for Acquisition and Technology. December 1999.

Department of Defense. *Defense Science Board Report on Warfighting Transformation*. Washington, DC: Office of the Under Secretary of Defense for Acquisition and Technology. September 1999.

Department of Defense, Section 912C Requirements and Acquisition Study Working Group. *Section 912C Report: Requirements and Acquisition*. Washington, DC: Office of the Secretary of Defense. June 1999.

Department of Defense. *An Intelligence Resource Manager's Guide*, 1997 Edition, 4th Printing. Washington DC: Joint Military Intelligence Training Center, July 1999.

Dupuy, R. Ernst and Dupuy, Trevor N., *The Encyclopedia of Military History*, 2d Edition, New York: Harper and Row, 1985.

Finelli, Frank. "Transforming Aerospace Power." *Airpower Journal*. Summer 1999

Hamel, Gary and Prahalad, C.K. *Competing For The Future*. Boston: Harvard Business School Press, 1996.

Gansler, Jacques S. "Achieving Dominant Battlespace Awareness Through Advanced Information Technology." Speech to Armed Forces Communications and Electronics Association. September 29, 1999. Online. Internet, January 18, 2000. Available from http://www.infowar.com/mil_c4i/99/mil_c4i_101899b_j.shtml.

Gansler, Jacques S. and Ralston, Joseph W. Memorandum titled "Implementing Requirements Generation and Acquisition Policy," July 14, 1999. Online. Internet, January 18, 2000. Available from http://web.deskbook.osd.mil/reflib/MDOD/031DV/031DVDOC.HTM.

Gehman, Harold W. "What Kind of Transformation Do You Want." *Proceedings*. February 2000. Online. Internet, February 4, 2000. Available from http://www.usni.org/Proceedings/Articles00/PROgehman.htm.

Goodman, Glenn W. Jr. "Chief Advocate for Jointness," *Armed Forces Journal International*, December 1999.

Hoffman, Frank. "Innovation Can Be Messy." *Proceedings*. January 1998.

"Interview with Admiral Harold W. Gehman Jr." *Seapower*. February 2000.

"Interview: US Army Vice Chief of Staff." *Proceedings*. February 2000.

Lewis, Leslie et al. "Joint Warfighting Capabilities (JWCA) Integration." *RAND Report*. Santa Monica, CA: RAND Corporation, 1998.

Lieberman, Joe. "Transforming National Defense for the 21st Century," speech delivered to U.S. Army Conference on Strategic Responsiveness, November 2, 1999.

National Defense Panel. *Transforming Defense: National Security in the 21st Century*, December 1997. Online. Internet, December 1999. Available from http://www.dtic.mil/ndp/FullDoc2.pdf.

Office Of The Under Secretary Of Defense (Comptroller). *National Defense Budget Estimates For FY 2001*, Table 6-3, 74. On-line. Internet, March 2000. Available from http://www.dtic.mil/comptroller/fy2001budget/fy2001grbk.pdf.

O'Hanlon Michael E., "Beware the 'RMA'nia!'" paper presented at National Defense University, September 9, 1998.

Owens, William A. "Making the Joint Journey." *Joint Forces Quarterly*, Spring 1999.
Owens, William A. and Blaker, James R. "Overseeing Cross-Service Trade Offs." *Joint Force Quarterly*, Autumn 1996.
Philpott, Tom. "Low Profile, High Impact." *The Retired Officer Magazine*. June 1999.
Sheehan, John J. "Next Steps in Joint Force Integration" *Joint Forces Quarterly*. Autumn 1996.
US Government Accounting Office. "Combat Air Power: Joint Mission Assessments Needed Before Making Program and Budget Decisions." *GAO Study*. Washington, DC: Government Printing Office, September 20, 1996.
US Joint Chiefs of Staff. *Instruction 3137.01a: The Joint Warfighting Capabilities Assessment Process*. Washington, DC: Joint Chiefs of Staff. January 22, 1999.
US Joint Chiefs of Staff. *Instruction 3170.01a: Requirements Generation System*. Washington, DC: Joint Chiefs of Staff. August 10, 1999.
US Joint Chiefs of Staff. *Joint Vision 2020*. Washington, DC: Government Printing Office. June 2000.
White, John. Untitled remarks to American Defense Preparedness Association, December 19, 1996. Online. Internet, February 2, 2000. Available from http:/www.defenselink.mil/news/Dec1996/b122096_bt684-96.html.
White House. *A National Security Strategy for a New Century*. Washington, DC: Government Printing Office, December 1999.
Wolfe, Frank. "Myers: Pentagon Needs JROC Influence Up Front," *Defense Daily*, April 5, 2000.
Wolfe, Frank. "Warner: Speed Development Of Unmanned Combat Systems." *Defense Daily*. February 9, 2000.