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Revolutionary Ambivalence

Thomas G. Mahnken
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FitzSimonds

Understanding Officer Attitudes toward Transformation

Over the past decade a growing number of defense analysts, government officials, and military officers have argued that the growth and diffusion of stealth, precision, and information technology will drastically alter the character and conduct of future wars, yielding a revolution in military affairs (RMA).¹ George W. Bush and his administration came to office promising to transform the U.S. armed forces by skipping a generation of technology. In a speech at the Norfolk Navy Base on February 13, 2001, President Bush pledged to “move beyond marginal improvements to harness new technologies that will support a new strategy.” He called for the development of ground forces that are lighter, more mobile, and more lethal, as well as manned and unmanned air forces capable of striking across the globe with precision.²

Secretary of Defense Donald Rumsfeld issued the administration’s formal strategy for transforming the U.S. military in June 2003. The Transformation Planning Guidance (TPG) document defines “transformation” as “a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organizations that exploit our nation’s advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world.”³ The fundamental assumption of the TPG is that existing U.S. forces—and evolutionary improvements to those forces—will not be

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1. See, for example, William J. Perry, “Desert Storm and Deterrence,” *Foreign Affairs*, Vol. 70, No. 4 (Fall 1991), pp. 66–82; Andrew F. Krepinevich, “Cavalry to Computer,” *National Interest*, No. 37 (Fall 1994), pp. 30–42; and Eliot A. Cohen, “A Revolution in Warfare,” *Foreign Affairs*, Vol. 75, No. 2 (March/April 1996), pp. 37–54.

2. Quoted in David E. Sanger, “Bush Details Plan to Focus Military on New Weaponry,” *New York Times*, February 14, 2001, p. 1.

3. Donald H. Rumsfeld, *Transformation Planning Guidance* (Washington, D.C.: Department of Defense, June 2003), p. 3.

adequate for future threats, new challenges, and unexpected circumstances. The explicit goal is to transition from “an industrial age to an information age military” to achieve “fundamentally joint, network-centric, distributed forces capable of rapid decision superiority and massed effects across the battlespace.”⁴ In his foreword to the TPG, Rumsfeld states that transformation is not limited to forces, but includes people and processes: “We must transform not only the capabilities at our disposal, but also the way we think, the way we train, the way we exercise, and the way we fight.”⁵ In other words, the current path is not satisfactory: A major course change is required, and required now.

The essence of the TPG is a detailed set of actions and milestones that seek to institutionalize the process of “continual transformation” within the Defense Department’s force planning, programming, and budgeting system. The transformation goals and processes recommend significant operational and organizational changes that should be expected to have widespread and lasting impact within each of the military services.

Publicly, the individual military services have enthusiastically embraced the concept of force transformation. Yet major changes in dominant platforms, concepts, or organizations have not been evident. With the possible exception of the Army’s stated intention to move from a heavy-weight force of armored and mechanized divisions to a medium-weight Objective Force employing lighter and more dispersed formations, the services would appear to be following normal paths of evolutionary improvement rather than radical change. The media have been filled with accounts of repeated clashes between Rumsfeld and advocates of change, on the one hand, and the military services, on the other. More than two years into Rumsfeld’s tenure as secretary of defense, the Defense Department has canceled only one major weapons program, the Army’s Crusader artillery system.

This article explains why it has proven difficult to implement the type of large-scale change within the military services that the Bush administration seeks. We believe that broad support within the officer corps is a key element in force transformation. We argue that although the officer corps is open to the idea of change in the abstract, this attitude does not extend to changes that would create new services or devalue currently dominant military systems. Senior civilian and military leaders, Congress, and the defense industry all figure prominently in the theoretical literature on innovation and have received most

4. Ibid. pp. 1, 3.

5. Ibid.

of the attention in the current debate over force transformation.⁶ The role of the officer corps has received much less scrutiny.

Yet there are four compelling reasons why it is important to understand officer attitudes. First, the military services will be the ultimate practitioners of new ways of war. The extent to which their members are enthusiastic about change may help to determine the success or failure of new technologies, operational concepts, and organizations. Second, although few officers will likely emerge as true innovators, the existence of a climate conducive to innovation within the officer corps may encourage individuals both to generate new ideas and to remain in the service to bring them to fruition. Third, a large percentage of career-oriented officers will rise to senior leadership positions within their services in the next ten to twenty years. In those roles, they will establish command climates that will either support or inhibit risk taking and innovation. Past research has demonstrated the importance to innovation of senior officers who protect and nurture the careers of young innovators under their command who are willing to take risks.⁷ Finally, officers are the recognized experts in military affairs in the United States. They should be expected to take a leading role in determining the need for adopting different approaches to warfare.

This article presents the initial findings of a research study, conducted between 1999 and 2001, of the attitudes of U.S. and foreign military officers toward transformation. Our results demonstrate the limited utility of characterizing the U.S. military as dominated by either technophiles or Luddites. In some ways, the officers we surveyed enthusiastically embraced new ways of war. They believed that information age technology, doctrine, and organizations would give the U.S. military a decisive battlefield edge and predicted that space and cyberspace would become important theaters of war. In other ways, however, they were quite conservative, equating transformation with marginal changes to existing weapons rather than a wholesale shift in the way the United States organizes, trains, and equips its forces.

The project yielded a number of surprising results. Although officers were

6. Deborah D. Avant, *Political Institutions and Military Change: Lessons from Peripheral Wars* (Ithaca, N.Y.: Cornell University Press, 1994); Emily O. Goldman, "The U.S. Military in Uncertain Times: Organizations, Ambiguity, and Strategic Adjustment," *Journal of Strategic Studies*, Vol. 20, No. 2 (June 1997), pp. 41–74; Elizabeth Kier, *Imagining War: French and British Military Doctrine between the Wars* (Princeton, N.J.: Princeton University Press, 1997); Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars* (Ithaca, N.Y.: Cornell University Press, 1984); Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, N.Y.: Cornell University Press, 1991); and Kimberly Marten Zisk, *Engaging the Enemy: Organization Theory and Soviet Military Innovation, 1955–1991* (Princeton, N.J.: Princeton University Press, 1993).

7. In particular, Stephen Rosen has shown the importance of senior officers in providing professional support to proponents of change. Rosen, *Winning the Next War*, pp. 20, 251.

often averse to changes that would devalue their service and branch's dominant missions and platforms, this was not always the case. For example, fully half of Air Force officers believed that manned aircraft would become less important—and unmanned air vehicles more important—over time. In addition, the officers we surveyed seemed unconcerned with threats to U.S. bases, power projection forces, and information networks, challenges that the Defense Department leadership has identified as among the most significant facing U.S. forces. They were either unaware of threats to U.S. forces or were convinced that the U.S. military would be able to overcome them. Finally, the study revealed that, compared with their U.S. counterparts, foreign officers see the U.S. armed forces as both more capable and more vulnerable.

Our results also demonstrate that it would be simplistic to view the U.S. officer corps as possessing a unified set of attitudes toward transformation. Rather, each service holds distinct views about future warfare. Officers of different ranks also had significantly different views. Contrary to the popular perception that younger officers are more enthusiastic about new ways of war than their seniors, we found that in a number of instances senior officers were more supportive of new combat methods than their juniors. Also surprising, combat experience did not appear to have significantly shaped officer attitudes.

This article contains four sections. The first uses the literature on officer attitudes toward military innovation to derive hypotheses linking attitudes toward new ways of war to various demographic variables. The second describes the methodology of our project. The third discusses the project's findings regarding officer attitudes toward new technology, doctrine, and organization; the impact of the information revolution on currently dominant weapons; the emergence of new ways of war; the character of future wars; the impetus for change; and the character and depth of change that is required.⁸ The concluding section offers some implications of this research for the theory and practice of military innovation.

Innovation and the Officer Corps

Existing theories of military innovation differ in their assumptions regarding officer attitudes toward innovation. Barry Posen characterizes the officer corps

8. The project and its results are documented more extensively in Thomas G. Mahnken and James R. FitzSimonds, *The Limits of Transformation: Officer Attitudes toward the Emerging Revolution in Military Affairs* (Newport, R.I.: Naval War College Press, 2003).

as averse to change, writing that “generally, it is not in the interests of most of an organization’s members to promote or succumb to radical change.”⁹ In his view, innovation generally flows from failure on the battlefield or civilian intervention.¹⁰ Stephen Rosen argues that peacetime military innovation occurs when respected senior military officers formulate new tasks and promotion paths.¹¹ Although he does not specifically discuss the attitude of the officer corps as a whole toward innovation, his theory assumes the existence of pockets of support for innovation within the officer corps from which senior innovators emerge.

Observers of contemporary debates over military transformation also differ over how enthusiastic the U.S. armed forces are about emerging warfare areas. In each case, however, their judgments are based more on anecdotal evidence than on systematic study. Williamson Murray, for example, has portrayed the current officer corps as dominated by technophiles.¹² Andrew Krepinevich, by contrast, argues that the services are profoundly conservative and that their planning and acquisition is governed by questionable—and potentially outmoded—assumptions.¹³ Similarly, Eliot Cohen portrays the services as dominated by officers who are wedded to technology and concepts of declining utility. He argues, “The services cling to established ways of war, and to combinations of technology, organizations, and personnel systems that have come to acquire value in and of themselves—even if they are no longer entirely functional.” He notes, however, that each service also contains groups of senior officers who are enthusiastic about new combat methods: “Behind them are far greater numbers of junior officers ready to experiment with the technologies and operational concepts that can make such notions reality.”¹⁴

As Cohen indicates, it may be simplistic to view the armed forces as being of one mind when it comes to information age warfare. Rather, it may be more useful to think of the military as divided into several schools of thought. If significant differences in officer attitudes do exist, then what is their source? What accounts for an officer’s attitude toward innovation? One potential explanation is that the culture of the armed services plays a dominant role in shaping officer attitudes. Each service has a unique personality, one shaped by

9. Posen, *The Sources of Military Doctrine*, p. 54.

10. *Ibid.*, p. 57.

11. Rosen, *Winning the Next War*, pp. 20–21.

12. Williamson Murray, “Does Military Culture Matter?” *Orbis*, Vol. 43, No. 1 (Winter 1999), p. 37.

13. Andrew F. Krepinevich Jr., “Why No Transformation?” *Joint Force Quarterly*, No. 23 (Autumn/Winter 1999–2000), p. 98.

14. Eliot A. Cohen, “Defending America in the Twenty-first Century,” *Foreign Affairs*, Vol. 79, No. 6 (November/December 2000), p. 52.

its history, traditions, mission, and operational environment. The Air Force emphasizes technology more than other services, while the Army and Marine Corps stress the human element of combat.¹⁵ It is therefore reasonable to expect that an officer's service affiliation may influence his attitude toward innovation. If this hypothesis is correct, then the views of an Army major are likely to resemble those of an Army colonel more closely than those of an Air Force major. Specifically, Air Force officers may be the most receptive about, and Army and Marine Corps officers the most skeptical of, emerging warfare areas. Navy officers may be more supportive than Army and Marine Corps officers, but less passionate than Air Force officers.

Military services, however, are not monolithic. Rather, they are composed of different branches that often have diverse goals, values, and interests. The Army, for example, includes the infantry, artillery, armor, aviation, airborne, and Special Forces communities. The Navy comprises aviators, surface warfare officers, and submariners, among others. The Air Force contains not only fighter, bomber, and transport pilots but also space and missile officers. Each has its own culture and attitudes toward war. An officer's branch affiliation may thus affect his attitude toward innovation. Specifically, one would expect officers to support developments that strengthen their branch and oppose those that weaken it.

Another possibility is that experience shapes an officer's attitudes. Current junior and field-grade officers entered the armed forces at the end of the Cold War, if not later. To them, the U.S.-Soviet competition is an increasingly remote and abstract historical event. Rather, they have spent the majority of their military careers in a period of unquestioned U.S. political, military, and economic dominance. They have witnessed or participated in a series of conflicts in which U.S. technological superiority appears to have played a central role. Senior and flag officers, by contrast, joined the U.S. armed forces either during or immediately after the Vietnam War. They lived through the demoralization that followed the U.S. withdrawal from Southeast Asia, the so-called hollow armed forces of the mid-to-late 1970s, and a string of failed or partially successful military operations, such as the 1980 failed Iran hostage rescue mission and the 1983 bombing of the Marine barracks in Beirut. It is reasonable to suppose that these experiences have produced officers with different attitudes toward innovation and transformation.

One surrogate for experience is rank. Studies of past innovations indicate

15. Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore, Md.: Johns Hopkins University Press, 1989), pp. 3, 19–20.

that an officer's rank may influence his enthusiasm toward new ways of war. Barton Hacker's study of the attitudes of British army officers toward mechanization between the two world wars revealed that lower- and middle-ranking officers were more enthusiastic about mechanization than senior and retired officers.¹⁶ In his study of innovation in the U.S. Navy, Vincent Davis concluded that the small number of true service innovators were officers from the middle ranks with approximately fifteen years' commissioned service.¹⁷ If this view is correct, then the attitudes of our hypothetical Army major are likely to resemble those of a major in the Air Force or Marine Corps or a lieutenant commander in the Navy more closely than those of an Army colonel.

Another source of experience is combat. Cognitive research shows that people learn most from firsthand experience, from events early in life, and from events that have important consequences.¹⁸ Combat experience may thus provide a compelling source of expectations about the character and conduct of future wars. It is reasonable to expect that combat veterans of a given service may be less enthusiastic about new combat methods than nonveterans of equivalent rank. Ground combat in particular has historically been characterized by considerable "fog" and "friction," and those who have experienced it firsthand may be more skeptical of claims that the exploitation of information technology will dramatically reduce it. Veterans of humanitarian and peace-keeping operations in, for example, Haiti and Somalia in the 1990s may be less enthusiastic about the promise of new ways of war than veterans of more technology-intensive conflicts such as the Persian Gulf War, Bosnia, and Kosovo.

Project Methodology

We employed a large-scale survey and a series of focus groups to probe officer attitudes and what shapes them. First, between March and October 2000 we conducted a survey of more than 1,900 students attending seven U.S. professional military education (PME) institutions;¹⁹ all officers were asked to com-

16. Barton C. Hacker, "The Military and the Machine: An Analysis of the Controversy over Mechanization in the British Army, 1919–1939," Ph.D. dissertation, University of Chicago, 1969.

17. Vincent Davis, *The Politics of Innovation: Patterns in Navy Cases* (Denver: University of Denver, 1966–67), pp. 33–36. Davis's conclusions, however, rest on a relatively small number of cases.

18. Robert Jervis, *Perception and Misperception in International Politics* (Princeton, N.J.: Princeton University Press, 1976), p. 239.

19. The survey was conducted after the 1998 U.S./U.K. air attacks on Iraq (Operation Desert Fox) and the 1999 NATO air operations in Kosovo and Yugoslavia (Operational Allied Force), but prior to the terrorist attack on the USS *Cole* (October 2000), the start of the George W. Bush administration (January 2001), and the terrorist attacks on the World Trade Center and Pentagon (September 2001).

plete all items.²⁰ The survey population included junior and field-grade officers (O-3 through O-4), senior officers (O-5 through O-6), and flag officers (O-7 through O-8) from all branches of the U.S. military, their reserve components and National Guard, as well as foreign officers and U.S. government civilians who were PME students. Although the survey population may not be a characteristic cross section of the entire officer corps, it is representative of the subset of the officer corps that attends PME institutions. Army, Air Force, and Marine Corps officers in particular are selected to attend PME institutions based on their potential for higher command. These officers represent the future leaders of their services. Responses from current senior and flag officers offer insight into the attitudes of those who will be responsible for making decisions about how the armed forces transform themselves over the next five to ten years. By contrast, current junior officers will occupy the leadership of the U.S. armed forces in 2020–25.²¹

Second, because the survey produced a number of surprising results, we convened four focus groups—composed of Army, Navy, Air Force, and Marine Corps officers, respectively—to discuss these issues in greater depth. Each consisted of eleven to twelve officers drawn from the student body of the College of Naval Command and Staff and the College of Naval Warfare at the Naval War College. Participants were representative of their services' combat and combat support career fields.

Officer Attitudes toward Future War

Our survey contained items designed to determine officer attitudes toward new technology, doctrine, and organizations; the impact of the information revolution on currently dominant weapons; the emergence of new approaches to combat; the changing character of warfare; and the character and depth of change required to transform the U.S. armed forces. The survey asked respondents to agree or disagree with a series of statements on a scale of 1 to 7, where 1 indicated strong disagreement and 7 strong agreement. We considered answers of 1, 2, or 3 to indicate general disagreement with the statement and 5, 6,

20. The institutions surveyed were Naval War College (including the College of Naval Command and Staff and College of Naval Warfare), Air Command and Staff College, Air War College, Army Command and Staff College, Army War College, National War College, and National Defense University's Capstone Course for newly promoted flag officers.

21. Current Department of Defense regulations require officers to retire after thirty years of commissioned service unless selected as flag officers. If current regulations remain in force, then today's field-grade officers, the largest proportion of the survey population, will be able to remain in uniform until 2020–25. Some portion of this group will remain in the armed forces until 2025–30.

or 7 to indicate general agreement. We coded responses falling in the middle range of 3, 4, and 5 as uncertainty or tending toward uncertainty.

ATTITUDES TOWARD THE EMERGING RMA

The survey revealed abstract support among officers for the proposition that the world is witnessing a revolutionary change in the character and conduct of war (see Table 1). Air Force and Navy officers tended to be more receptive to new ways of war and Army and Marine Corps officers more skeptical. It also revealed much uncertainty about all of these issues, perhaps reflecting both uncertainty as to how the RMA may unfold as well as skepticism as to whether the United States will have the political and military will to actually exploit its continuing technological advantage.²²

Analysts differ as to the benefits that may accrue to the United States if it transforms its armed forces through the widespread adoption of information age technology, doctrine, and organizations. The Joint Chiefs of Staff's overarching concept for future warfare, *Joint Vision 2010*, explicitly states that the successful exploitation of new technologies through the application of new operational concepts would enable the U.S. military to "dominate an opponent across the range of military operations."²³ As enthusiasts such as James Blaker argue, "The potency of the American RMA stems from new military systems that will create, through their interaction, an enormous military disparity between the United States and any opponent. Baldly stated, U.S. military forces will be able to apply military force with dramatically greater efficiency than an opponent, and do so with little risk to U.S. forces."²⁴ Others are skeptical that information technology will give the United States a meaningful—or durable—advantage.²⁵

Eighty-five percent of the officers we surveyed believed that "military forces employing information age technology, doctrine, and organizations will enjoy a substantial edge over those that do not," the strongest positive response in the survey (see Table 2). Air Force and Navy officers were more confident than their Army and Marine Corps counterparts, while senior officers were more

22. Because the term "revolution in military affairs" means so many things to so many people, the survey instead referred to "information age technology, doctrine, and organizations" throughout.

23. Joint Chiefs of Staff, *Joint Vision 2010* (Washington, D.C.: Department of Defense, 1996), p. 2.

24. James R. Blaker, "The American RMA Force: An Alternative to the QDR," *Strategic Review*, Vol. 25, No. 3 (Summer 1997), p. 22.

25. Richard J. Harknett and the JCISS Study Group, "The Risks of a Networked Military," *Orbis*, Vol. 44, No. 1 (Winter 2000), pp. 127–143.

Table 1. Attitudes toward the Emerging Revolution in Military Affairs.

Statement	Agree	Disagree	Uncertain
Military forces employing information age technology, doctrine, and organizations will enjoy a substantial edge over those that do not.	85%	10%	24%
New technology, doctrine, and organizational concepts will give the U.S. armed forces dominance over the full spectrum of potential adversaries.	75%	18%	39%
Those who believe that emerging technology will substantially alter the conduct of war are unrealistic.	30%	64%	40%

Table 2. Military forces employing information age technology, doctrine, and organizations will enjoy a substantial edge over those that do not.

	Agree	Disagree
Overall	85%	10%
Army	79%	15%
Marine Corps	81%	14%
Navy	93%	5%
Air Force	92%	5%
Junior/Field-grade officers	82%	12%
Senior officers	91%	6%
Flag officers	86%	6%

confident than junior officers. By contrast, whether or not an officer had served in combat did not appear to affect his attitude. For example, 85 percent of 1991 Gulf War veterans and 83 percent of Somalia veterans agreed with the above statement.

RMA advocates argue that the exploitation of new ways of war will give the United States an edge across the spectrum of conflict. Adm. William Owens has written, "If we decide to accelerate the [transformation] process by emphasizing those systems and weapons that drive the revolution, we can reach our goals years—perhaps decades—before any other nation."²⁶ Joseph Nye and Owens have argued that the emerging RMA will not only give the United

26. Adm. William A. Owens, U.S. Navy, "The Emerging System of Systems," *Proceedings*, Vol. 121, No. 5 (May 1995), p. 39.

States a battlefield edge against regional powers, but will also bolster efforts to deal with such dangers as international crime, terrorism, the proliferation of weapons of mass destruction, and environmental damage.²⁷

Others contend that information age ways of war are likely to be irrelevant in a world dominated by ethnic hatred, terrorism, and transnational crime.²⁸ As Cmdr. William Toti put it, the "RMA will have little impact on the kind of wars we see today. For example, RMA would have done nothing to help us prevent the slaughter of 800,000 people in 100 days in Rwanda. It would have done nothing to prevent a few thousand boys with rifles and rocket-propelled grenades from overwhelming our best troops—Rangers and Deltas—in Mogadishu. Nor would it have improved our capability to fight the kind of battle we saw in 1995 in Bosnia, where 7,000 men were killed in 48 hours. All our improved sensors would have allowed us to do there would have been to locate the gravesites more quickly."²⁹ Ralph Peters, then a lieutenant colonel in the U.S. Army, feared that "our post-RMA military may prove the most expensive white elephant in the history of mankind."³⁰

Three-quarters of the officers we surveyed agreed that new technology, doctrine, and organizational concepts will give the U.S. armed forces dominance over the full spectrum of potential adversaries. Air Force officers agreed most strongly, while their Army and Marine Corps counterparts were more skeptical. The fact that ground forces are involved in low-technology contingencies such as peacekeeping and humanitarian operations more often than air forces may help to explain this difference.

Discussion during the focus group sessions suggests that such a positive response might be conditional. Participants expressed strong confidence that the government would maintain significant technological superiority over any potential adversary. They were uncertain, however, as to whether the United States will have the political and military will to acquire and exploit these technologies. This might explain why 39 percent of the survey respondents tended

27. Joseph S. Nye Jr. and William A. Owens, "America's Information Edge," *Foreign Affairs*, Vol. 75, No. 2 (March/April 1996), p. 22.

28. Charles J. Dunlap Jr., "21st-Century Land Warfare: Four Dangerous Myths," *Parameters*, Vol. 27, No. 3 (Autumn 1997), pp. 27–37; Col. T.X. Hammes, U.S. Marine Corps, "War Isn't a Rational Business," *Proceedings*, Vol. 124, No. 7 (July 1998), pp. 20–25; and Ralph Peters, "After the Revolution," *Parameters*, Vol. 25, No. 2 (Summer 1995), pp. 7–14.

29. Cmdr. Bill Toti, U.S. Navy, "Stop the Revolution: I Want to Get Off," *Proceedings*, Vol. 126, No. 7 (July 2000), p. 32.

30. Peters, "After the Revolution," p. 8.

toward uncertainty on this issue. A more accurate interpretation of the responses might thus be that the U.S. military will be favored *if* it actually chooses to exploit new technology, doctrine, and organizational concepts.

IMPACT OF THE INFORMATION REVOLUTION ON DOMINANT WEAPONS

To a large extent, current U.S. armed forces resemble those that fought World War II. Manned aircraft dominate war in the air, while on land the main battle tank is the king of the battlefield. The aircraft carrier remains the capital ship. RMA advocates argue, however, that the growth and diffusion of information technology may erode the dominance of such weapon systems.³¹ Some believe, for example, that over the next several decades unmanned systems could dominate air warfare, ground combat could transition to geographically distributed forces, many naval combatants could be driven underwater, and space and the information spectrum could emerge as increasingly important domains of military conflict.³² President Bush's goal is to create a military force that is characterized by "mobility and swiftness, one that is easier to deploy and sustain, one that relies more heavily on stealth, precision weaponry and information technologies," clearly implying that current dominant platforms and systems will need to be replaced.³³

The officers we surveyed believed that the information revolution would not reduce the utility of currently dominant weapons platforms (see Table 3). In each case, a majority of officers held that currently dominant systems would be as important in 2020 as they are today. Army officers tended to believe most strongly in the enduring utility of current systems, including not only armored and mechanized formations but also manned aircraft and carrier battle groups. Air Force officers, by contrast, were most willing to contemplate change, even if it involved devaluing manned aircraft. Higher-ranking officers appeared more uncertain about the continued importance of today's dominant systems than more junior officers.

Armored and mechanized formations have dominated the U.S. Army since World War II. Some observers have claimed, however, that their utility is de-

31. Cohen, "Defending America in the Twenty-first Century," p. 52; Krepinevich, "Why No Transformation?"; and *Transforming Defense: National Security in the 21st Century, Report of the National Defense Panel* (Washington, D.C.: Department of Defense, 1997), pp. 33–41.

32. See, for example, Michael G. Vickers, *Warfare in 2020: A Primer* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 1996), p. i.

33. Quoted in Rumsfeld, *Transformation Planning Guidance*, p. 3.

Table 3. Impact of the Information Revolution on Currently Dominant Weapons Platforms.

Statement	Agree	Disagree	Uncertain
Armored and Mechanized formations will be as important in 2020 as they are today	51%	34%	55%
Manned aircraft will be as important in 2020 as they are today.	58%	35%	48%
Within the next 20 years, uninhabited combat aerial vehicles will become the predominant means of conducting strike warfare.	46%	36%	61%
Carrier battle groups will be as important in 2020 as they are today.	68%	21%	46%

clining. In particular, they argue that heavy armored formations are poorly suited to humanitarian and urban operations.³⁴ In recent years the Army has begun to reorient itself from a tank-heavy force designed to protect Western Europe to one that is more mobile and lethal. In October 1999 the Army chief of staff, Gen. Eric Shinseki, announced a goal of transforming the Army into a medium-weight force capable of deploying a 5,000-man combat brigade anywhere in the world within ninety-six hours, a division in 120 hours, and five divisions in thirty days.³⁵ He designated two brigades at Fort Lewis, Washington, as test beds to explore new concepts and organizations. These units have traded in their tracked M1A1 Abrams tanks and M2 Bradley fighting vehicles and are developing innovative tactics and organizations. By 2005 the Army expects to field four such Stryker Brigade Combat Teams. By the end of the decade, the Army has plans to begin replacing its seventy-ton M1A1 Abrams main battle tanks with the twenty-ton Future Combat System, a network of light vehicles—possibly including unmanned systems.³⁶ Some experts have argued for even more radical changes, including the development of ground forces that are dramatically smaller and stealthier, with most of their combat power exported offshore.³⁷

34. Lt. Col. Ralph Peters, U.S. Army, "The Future of Armored Warfare," *Parameters*, Vol. 27, No. 3 (Autumn 1997), pp. 50–59.

35. Jason Sherman, "Dream Work," *Armed Forces Journal International*, May 2000, p. 25.

36. *Ibid.*, p. 28.

37. Vickers, *Warfare in 2020*, p. 8.

A slim majority of officers believed that armored and mechanized formations will be as important in 2020 as they are currently, whereas a significant minority felt they would be less important. Equally telling, more than half of respondents tended toward uncertainty on this issue. This is notable given that the Army has publicly committed itself to moving away from armored forces. It seems that officers are skeptical that the Army will actually follow through with its stated plans.

Not surprisingly, Army officers believed in the enduring importance of armored and mechanized formations more strongly than did their counterparts in other services (see Table 4). Nor is it entirely unexpected that armor branch Army officers believed strongly in the enduring importance of armored forces: 72 percent of armor officers agreed that armored and mechanized formations would be as important in 2020 as they are currently. Such results corroborate anecdotal evidence of opposition from active-duty and retired armor officers to General Shinseki's attempts to replace armored and mechanized divisions with medium-weight units.³⁸ By contrast, only 60 percent of infantry and 57 percent of Special Forces officers believed in the enduring importance of heavy forces.

Some RMA advocates have argued that unmanned systems will play an increasingly prominent role in war in the air, a trend that challenges the Air Force's institutional culture and warrior ethos.³⁹ Unmanned aerial vehicles (UAVs) saw extensive use in military operations of the 1990s (and even greater use since the survey was conducted). Some have recommended cutting manned aircraft—particularly tactical fighter forces—in favor of greater investment in UAVs and UCAVs (unmanned combat aerial vehicles), stealthy long-range cargo aircraft, advanced precision-guided munitions, and satellites.⁴⁰

Nearly six out of ten officers agreed that manned aircraft would be as important in 2020 as they are currently. As with the statement regarding armored and mechanized forces, however, a large percentage tended toward uncertainty. And whereas Army officers had the greatest confidence in the future of heavy formations, Air Force officers as a group actually had the least faith in the continued importance of manned aircraft: Only 45 percent of Air Force

38. Rowan Scarborough, "Generals Not Fans of Lighter Army," *Washington Times*, May 30, 2000, p. 1.

39. Vickers, *Warfare in 2020*, p. 7.

40. Andrew F. Krepinevich Jr., *The Air Force of 2015* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 1996), pp. 33–34.

Table 4. Armored and mechanized formations will be as important in 2020 as they are today.

	Agree	Disagree
Overall	51%	34%
Army	56%	29%
Marine Corps	53%	31%
Navy	54%	27%
Air Force	40%	44%
Junior/Field-grade officers	54%	31%
Senior officers	43%	40%
Flag officers	39%	41%

officers—but 66 percent of Marine Corps, 61 percent of Army, and 57 percent of Navy officers—believed that manned aircraft would be as important in 2020.

Not surprisingly, aviators had greater confidence in the future importance of manned aircraft than the general population. Sixty-two percent of Air Force pilots and navigators believed that manned aircraft would be as important in twenty years as they are currently. By contrast, the same percentage of Air Force space, missile, and command and control officers believed that manned aircraft would be less important. The attitudes of officers with combat experience did not differ significantly from those of officers who had not served in combat.

The focus groups indicated that an officer's attitude toward the future importance of manned aircraft depended on his dominant image of "manned aircraft." Whereas many Air Force and Navy officers who participated in the focus groups equated manned aircraft with reconnaissance and strike missions, Army and Marine Corps officers tended to think about transport and close air support—missions that are likely to continue to require a human operator. Forty-six percent of officers felt that UCAVs would become the predominant means of conducting strike warfare within the next twenty years. More than six in ten tended toward uncertainty, however, indicating that most officers really do not know what the prospect is of this possible development. Air Force officers were the most enthusiastic about UCAVs, with 53 percent believing that they would become the predominant means of conducting strike warfare within the next twenty years. By contrast, only 42 percent of Army officers and 43 percent of Marine Corps officers held the same view.

Our focus groups indicated that assumptions about the rate of technological development and cultural acceptance of unmanned systems conditioned an officer's response. There was a general consensus that UAVs were increasingly important, particularly for reconnaissance and surveillance missions. Officers differed, however, as to whether it would be feasible for them to perform strike missions reliably within the next twenty years. Their assessments of the rate at which the culture of the services would change to accept unmanned strike systems also diverged. These factors likely explain much of the high degree of uncertainty that surrounds this issue.

RMA advocates have predicted that carrier battle groups may decline in importance over time. Krepinevich, for example, has argued that aircraft carriers are of decreasing utility due to their high cost and growing vulnerability, and because of the increasing availability of substitutes for carrier air power for conducting missions close to an adversary's coastline.⁴¹ He has argued that the Navy should reduce its carrier force while increasing its investment in concepts such as surface ships and submarines armed with large numbers of highly accurate, long-range cruise or ballistic missiles.⁴² Some envision such vessels as the capital ships of the future (of which the Navy's ongoing SSBN-to-SSGN conversion program might be a harbinger).⁴³

More than two-thirds of the officers we surveyed believed that carrier battle groups would be as important in 2020 as they are currently. The prominent role of carrier-based tactical air power during Operation Enduring Freedom in Afghanistan and Operation Iraqi Freedom may reinforce this view. Not surprisingly, Navy officers were the most enthusiastic about the future of carrier battle groups, with 80 percent arguing that they would be as important in 2020. Air Force officers were most skeptical. But even among them, nearly two-thirds believed in the enduring importance of carrier battle groups.

Officers who participated in our focus sessions argued that carrier battle groups would continue to be important because they perform valuable roles such as presence. The statement did not stipulate that the carrier battle group mission would not change in the future, but focus group participants generally understood that to be implied. A number of officers observed that the United

41. Andrew F. Krepinevich Jr., *A New Navy for a New Era* (Washington, D.C.: Center for Strategic and Budgetary Assessments, 1996), pp. 37, 45.

42. *Ibid.*, p. 41.

43. Vickers, *Warfare in 2020*, p. 10.

States would still have a large number of Nimitz-class aircraft carriers in 2020 in any event. Others, however, noted that they represent lucrative targets and may be becoming increasingly vulnerable to long-range targeting and attack.

Although officers believe that new technology, doctrine, and organizations will give the United States a decisive battlefield edge, they tended to equate transformation with marginal changes to existing forces. The majority of officers had confidence in the enduring importance of currently dominant systems. In each case, however, such responses were tinged with uncertainty. Not surprisingly, this was greatest when it came to the importance of UCAVs (which, subsequent to the survey, saw their battlefield debut in Afghanistan in 2001). By contrast, the carrier battle group has clearly established itself as a durable symbol of U.S. power. In addition, the survey yielded some surprising results, including Air Force officers' belief that manned aircraft will be of decreasing importance and flag officers' uncertainty over the future utility of currently dominant systems.

EMERGENCE OF NEW WAYS OF WAR

The officers we surveyed believed in the enduring importance of currently dominant systems, though they also felt strongly that war is entering new dimensions. The survey revealed a consensus among officers of all services and ranks that space and cyberspace will play an increasingly important role in warfare (see Table 5). Although they believed that information networks are highly vulnerable, only a small percentage believed that future adversaries will be able to deny the United States their use. Foreign officers were much more concerned. Officers were more certain of their responses to statements on this topic than most others: In none did more than half of the respondents tend toward uncertainty.

Many of those who argue that the U.S. military is in the midst of a revolution in warfare predict that it will not only change war on land, at sea, and in the air, but also that it will bring war into space and cyberspace. RMA advocates contend that space is likely to play an increasingly important role in future conflicts. Indeed, some predict that it may be considered an independent theater of military operations.⁴⁴ The report of the 1997 National Defense Panel cited the possibility that future adversaries may challenge the United States' control of space.⁴⁵ Similarly, the 2001 Quadrennial Defense Review maintained

44. *Ibid.*, pp. 11–12.

45. National Defense Panel, *Transforming Defense*, pp. 12–14.

Table 5. Emergence of New Ways of War.

Statement	Agree	Disagree	Uncertain
Within the next 20 years, conflicts will include combat operations in or from space.	76%	14%	48%
Within the next 20 years, attacks upon computer networks will become a central feature of military operations.	85%	10%	34%
Information systems and networks are highly vulnerable to enemy countermeasures.	76%	15%	46%
Future adversaries will be able to deny the U.S. the use of information networks.	15%	78%	32%

that “space and information operations have become the backbone of networked, highly distributed commercial civilian and military capabilities. This opens up the possibility that space control—the exploitation of space and the denial of the use of space to adversaries—will become a key objective in future military competition.”⁴⁶ The report also identified increasing the capability and survivability of space systems and their support infrastructure as a key objective.⁴⁷

Three-quarters of the officers we surveyed believed that within the next twenty years, conflicts would include combat operations in or from space. This view held true among officers of all services and ranks. Although foreign officers were slightly less confident than their U.S. counterparts that future wars will include combat operations in or from space, more than seven out of ten nonetheless agreed with the proposition.

Many of the focus group participants viewed combat operations in space as inevitable, and nearly all interpreted “combat operations in and from space” as implying the actual launching of weapons into or out of outer space. A number argued that potential U.S. adversaries would exploit the perceived vulnerability of U.S. military satellites to electromagnetic pulse effects in an attempt to counter the U.S. advantage in space. Others believed that the United States would station weapons in space to strike the Earth. They also acknowledged

46. *Quadrennial Defense Review Report* (Washington, D.C.: Department of Defense, September 30, 2001), p. 7.

47. *Ibid.*, p. 30.

the barriers to combat operations in space, including treaty limitations and less formal unilateral or multilateral restraint.

The growing dependence of the United States on information networks has increased their attractiveness as targets.⁴⁸ The 2001 Quadrennial Defense Review, for example, predicted that “states will likely develop offensive information operations and be compelled to devote resources to protecting critical information infrastructure from disruption, either physically or through cyber space.”⁴⁹ Indeed, some analysts argue that attacks on information networks may become a new form of strategic warfare.⁵⁰

More than eight in ten officers believed that over the next twenty years attacks on computer networks would become a central feature of military operations. As with the previous statement regarding military operations in space, officers of all services and ranks shared this view. Moreover, the response of foreign officers was virtually indistinguishable from that of their U.S. counterparts. Only 34 percent of respondents tended toward uncertainty, compared with 48 percent of those who answered the previous statement regarding combat in space. In other words, they seemed to be much more certain that computer network attack would be an important feature of future conflicts than they were of combat operations in or from space.

Three-quarters of the officers we surveyed believed that information systems and networks were highly vulnerable. There was a consensus among officers of all services and ranks on this issue as well. Foreign officers expressed both a higher level of confidence in the resistance of networks to attack and a higher level of uncertainty than their U.S. counterparts.

Although a large majority of officers felt that computer network attack was becoming a central feature of warfare and that information networks are vulnerable, nearly eight out of ten argued that future adversaries would not be able to deny the United States their use. This surprising result appears to indicate that officers believe that the United States will be able to overcome any challenges to access to information networks that it will face. Such confidence is also reflected in responses to other survey statements exploring potential threats to U.S. forces, discussed below, and was confirmed by the focus groups.

48. See, for example, John Arquilla and David Ronfeldt, “Cyberwar Is Coming!” *Comparative Strategy*, Vol. 12, No. 2 (April–June 1993), pp. 141–165; Martin Libicki, “The Emerging Primacy of Information,” *Orbis*, Vol. 40, No. 2 (Spring 1996), pp. 261–273; and Richard Szafranski, “A Theory of Information Warfare: Preparing for 2020,” *Airpower Journal*, Vol. 9, No. 1 (Spring 1995), pp. 56–65.

49. *Quadrennial Defense Review Report*, p. 7.

50. Roger C. Molander, Andrew S. Riddile, and Peter A. Wilson, *Strategic Information Warfare: A New Face of War* (Santa Monica, Calif.: RAND, 1996).

One might argue that such a response was the result of lack of knowledge of U.S. information systems, their vulnerabilities, and the threat to them. However, those officers with the greatest knowledge of information networks—those in fields related to communications—were even more skeptical than the general survey population that adversaries would be able to deny the United States use of information networks. Intelligence officers, whose job it is to understand foreign military capabilities, were similarly skeptical.⁵¹

Senior and flag officers were more concerned about the threat to U.S. information networks than junior officers, perhaps because they were more familiar with the U.S. military's dependence on command, control, communications, and intelligence systems or because they possessed a greater understanding of the information warfare threat. Most significantly, however, three times as many foreign officers believed that future adversaries would be able to disrupt U.S. information networks than their American counterparts.

IMPACT ON THE CHARACTER OF WAR

Most officers believed that new combat methods would make it easier for the United States to use force to achieve decisive battlefield victories with substantially reduced risk of casualties (see Table 6). Many felt that new technologies would substantially reduce the duration of future conflicts. In general, Army and Marine Corps officers were more skeptical than Air Force and Navy officers about the impact of technological change on the character of war. Senior officers were more enthusiastic than their juniors. Foreign officers tended to believe much more strongly than their U.S. counterparts that the United States will find it easier to use force and to achieve decisive battlefield victories—and will be able to do so with substantially reduced risk of U.S. casualties.

The idea that the American public has developed a low tolerance for combat casualties, whether true or not, has become an axiom of the post-Cold War military mind-set. *Joint Vision 2010* states that “the American people will continue to expect us to win any engagement, but they will also expect us to be more efficient in protecting lives and resources,” and that “commanders will be expected to reduce the costs and adverse effects of military operations.”⁵² Among its explicit goals is a reduction in risk to U.S. troops by making it more

51. Nine percent of cryptologists and communication/signal corps officers agreed with the statement, while 83 percent disagreed. Eleven percent of intelligence officers agreed, while 82 percent disagreed.

52. *Joint Vision 2010*, p. 8.

Table 6. Impact on the Character of War.

Statement	Agree	Disagree	Uncertain
New technology, operational concepts, and organizations will:			
Offer the ability to engage in high-intensity operations with substantially reduced risk of U.S. casualties.	63%	28%	56%
Substantially reduce the duration of future conflicts.	49%	32%	50%
Make it easier for the U.S. to use force.	63%	24%	56%
Make it easier for the U.S. to achieve decisive battlefield victories.	60%	25%	62%

difficult for them to be found, and by providing them adequate protection from kinetic and information attack through multilayered defense.⁵³

Nearly two-thirds of the officers surveyed believed that new ways of war would allow the United States to “engage in high-intensity operations with substantially reduced risk of U.S. casualties.” It is not clear whether this reflects a true belief that future forces will reduce the risk of casualties, or the conviction that future commanders and the American people will simply find anything else unacceptable. In addition, the context within which this statement was interpreted is not known. It is unclear whether the average officer was thinking of Vietnam, the 1991 Gulf War, or the 1999 Kosovo conflict as the benchmark when considering the term “substantially reduced.” All of these unknowns are likely reflected in the fact that more than half of the officers tended toward uncertainty in their response to this statement. Army officers disagreed most strongly with the notion that new ways of war would yield substantially reduced U.S. casualties, while Air Force and Navy officers were considerably more positive (see Table 7). In addition, higher-ranking officers responded more positively than junior officers. Most interesting was the disproportionately positive response of foreign officers. This may reflect the fact that foreign officers are more confident in American technology than their American counterparts, or that they see the United States putting higher priority on fielding systems that reduce U.S. casualties. It also may reflect, however, a general foreign perception of reduced U.S. tolerance for combat losses based

53. Ibid., pp. 18–22.

Table 7. New technology, operational concepts, and organizations will offer the ability to engage in high-intensity operations with substantially reduced risk of U.S. casualties.

	Agree	Disagree
Overall	63%	28%
Army	52%	36%
Marine Corps	59%	32%
Navy	69%	23%
Air Force	73%	18%
Junior/Field-grade officers	59%	30%
Senior officers	69%	21%
Flag officers	71%	24%

on the seeming unwillingness of the United States to commit substantial ground forces to recent conflicts.

RMA advocates argue that the tempo of combat operations is increasing. *Joint Vision 2010* forecasts that the future force will enable “a more rapid transition from deployment to full operational capability” as well as an ability to more rapidly achieve military objectives.⁵⁴ John Warden’s vision of modern warfare includes the “near-simultaneous attack on every strategic- and operational-level vulnerability of the enemy,” leading to his rapid collapse.⁵⁵ Increased speed of command and execution are also key features of network-centric warfare, which predicts the ability to rapidly preclude an enemy’s strategic options and leave him “no viable courses of action.”⁵⁶

Nearly half of the officers we surveyed believed that new combat methods would substantially reduce the duration of future conflicts. Marine Corps and Army officers were more skeptical than their Navy and Air Force counterparts; flag officers tended to be more enthusiastic than junior, field-grade, or senior officers. Experiences such as the inconclusive outcomes in Iraq, Haiti, Somalia, and the Balkans may have had a major impact on their thinking. Even though the ground phase of the 1991 Gulf War lasted barely 100 hours, the commitment of U.S. forces to contain and deter Iraq continued for the nine years leading up to the survey.

54. *Ibid.*, pp. 13–14.

55. Col. John A. Warden III, U.S. Air Force, “The Enemy as a System,” *Airpower Journal*, Vol. 9, No. 1 (Spring 1995), p. 54.

56. David S. Alberts, John J. Garstka, and Frederick P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2d ed. (Washington, D.C.: C4ISR Cooperative Research Program, 1999), p. 165.

Nearly two-thirds of the officers surveyed agreed that new ways of war would make it easier for the United States to use force. Sixty-nine percent of Air Force officers and 63 percent of Navy officers, compared with only 59 percent of Marine Corps officers and 57 percent of Army officers, agreed with the statement. This probably reflects some level of differing confidence in the future capabilities of air power, and also possibly in long-range precision strike, information operations, and operational maneuver. Senior and flag officers agreed with the proposition more than junior officers. As with previous statements, foreign officers had a disproportionately positive response.

Six out of ten officers believed that new technology, operational concepts, and organizations would make it easier for the U.S. military to achieve decisive battlefield victories. An even higher percentage, however, tended toward uncertainty. This may indicate a perception that the answer depends on the type of conflict and the character of the opponent. Marine Corps officers were most skeptical of the proposition that new ways of war will make it easier for the United States to achieve decisive battlefield victories, with only 44 percent in agreement; Air Force officers were markedly more enthusiastic, with 68 percent in agreement. Flag officers were more receptive than their juniors, and foreign officers were more enthusiastic than their U.S. counterparts. This suggests that foreign officers have much more confidence in the U.S. ability to exploit technology than do their U.S. counterparts.

IMPETUS FOR CHANGE

Military innovation has frequently resulted from efforts to overcome challenges that defy a conventional solution. The 2003 Transformation Planning Guidance document stipulated the need for forces that can accomplish the six operational goals identified in the 2001 Quadrennial Defense Review:

1. Protecting critical bases of operations, including the U.S. homeland, forces abroad, allies, and friends, and defeating weapons of mass destruction and their means of delivery;
2. Assuring information systems in the face of attack and conducting effective information operations;
3. Projecting and sustaining U.S. forces in distant anti-access or area-denial environments and defeating anti-access and area-denial threats;
4. Denying enemies sanctuary by providing persistent surveillance, tracking, and rapid engagement with high-volume precision strikes against critical mobile and fixed targets;

5. Enhancing the capability and survivability of space systems and supporting infrastructure; and
6. Leveraging information technology and innovative concepts to develop an interoperable, joint command, control, communications, computer, intelligence, surveillance, and reconnaissance architecture and capability that includes a tailorable joint operational picture.⁵⁷

We presented respondents with statements that served to elicit their views of the first three of these challenges. We explored officer attitudes toward the information warfare threat in the previous section; this section examines attitudes toward threats to U.S. bases and power projection forces.

The survey results suggest that the vast majority of officers saw no need to change the way the U.S. military projects power abroad, at least in the area of potential threats posed by ballistic and cruise missiles (see Table 8). They had a very high level of confidence in the technological prowess of the U.S. military to protect American bases and forces. This corroborates the confidence most officers expressed in the U.S. ability to protect its information networks against hostile attack. By contrast, officers representing friends and allies of the United States had much less confidence that U.S. defenses will be adequate and tend to believe that U.S. carrier battle groups and fixed infrastructure will be at an increasing risk of attack.

The most compelling case for a threat to current and future U.S. forces arises from the proliferation of missiles with both increasing range and accuracy. The continued spread of nuclear, chemical, and biological technologies presents a threat to fixed and relatively immobile forces, while the growing availability of precise targeting information also increases the threat of precise delivery of conventional explosives out to ranges in the hundreds of kilometers.⁵⁸ Given that the United States has yet to field an effective defense against ballistic missiles, many see these weapons as the leading edge of a general “anti-access” capability intended to deny U.S. forces the forward staging needed for regional power projection.⁵⁹ Foreign developments in ballistic missile technology were highlighted in the 1990s by such events as the series of Chinese bal-

57. Rumsfeld, *Transformation Planning Guidance*, p. 10; and *Quadrennial Defense Review Report*, p. 30.

58. See, for example, National Intelligence Council, *Foreign Missile Developments and the Ballistic Missile Threat through 2015*, unclassified summary of a National Intelligence Estimate (Washington, D.C.: National Intelligence Council, 2002), http://www.cia.gov/nic/pubs/other_products/Unclassifiedballisticmissilefinal.htm.

59. Paul Bracken, “America’s Maginot Line,” *Atlantic Monthly*, December 1998, pp. 85–93, is representative of the more cogent, open-press analyses of the impact of ballistic missile proliferation.

Table 8. Impetus for Change.

Statement	Agree	Disagree	Uncertain
Future adversaries will be able to use long-range precision strike weapons such as ballistic and cruise missiles to attack carrier battle groups.	12%	73%	50%
Future adversaries will be able to use long-range precision strike weapons such as ballistic and cruise missiles to destroy fixed military infrastructure such as ports, airfields, and logistical sites.	9%	79%	43%

listic missile launches to locations off the coast of Taiwan in 1995 and 1996 and the unexpected launch by North Korea of the Taepodong-1 ballistic missile over Japan in 1998. The U.S. press provided wide coverage of a series of test failures of the U.S. Theater High Altitude Air Defense antiballistic missile system and cost overruns and delays in other theater ballistic missile defense programs.

Given the widespread press coverage of missile defense issues during the 1990s, the responses to statements regarding the potential missile threats to U.S. power projection forces were somewhat surprising. Officers expressed little concern with threats to U.S. carrier battle groups (see Table 9). Nearly three-quarters of officers believed that future adversaries would not be able to use ballistic and cruise missiles to attack carrier battle groups. Significantly, the statement posed the problem in terms of a group of ships and not specifically an aircraft carrier. Moreover, it did not use the terms “sink,” “destroy,” or “damage,” but only the term “attack”—which could also be construed to include unsuccessful attacks. Half of the respondents tended toward uncertainty regarding the missile threat to carrier battle groups, but only 12 percent of the officers expressed any agreement with this statement, and less than 2 percent agreed strongly.

Navy officers were marginally more concerned about the threat to carrier battle groups than officers of other services, and senior and flag officers were slightly more concerned than junior officers. Nevertheless, a large majority of officers of all services and ranks believed that carrier battle groups would be unaffected by these types of weapons. Intelligence officers, whose job it is to understand foreign military capabilities, held attitudes indistinguishable from those of the overall survey population. This is in line with the view of the over-

Table 9. Future adversaries will be able to use long-range precision strike weapons such as ballistic and cruise missiles to attack U.S. carrier battle groups.

	Agree	Disagree
Overall	12%	28%
Army	9%	36%
Marine Corps	9%	32%
Navy	16%	23%
Air Force	13%	18%
Junior/Field-grade officers	11%	30%
Senior officers	16%	21%
Flag officers	12%	24%
Foreign officers	34%	53%
U.S. officers	11%	74%

whelming majority of officers that the carrier battle group would be as important in twenty years as it is currently.

We can only speculate on the reason for such high confidence in the security of carrier battle groups among the broad officer population. The focus group participants indicated a general lack of understanding of the current and future threats to naval forces, such as low-flying supersonic cruise missiles and wake-homing torpedoes,⁶⁰ but generally felt that the inherent mobility of the carrier would continue to offer it a high level of security from being targeted and attacked. They also expressed tremendous confidence that the technological superiority of the United States will provide whatever defenses might be necessary to protect critical military assets. Responses from the focus group members indicate that the aircraft carrier has achieved tremendous status as an icon of U.S. military power worldwide that the United States must, and will, preserve and protect.

For some reason, officers were even more confident in the survivability of fixed facilities. Eight in ten believed that future adversaries would be unable to use ballistic and cruise missiles to destroy fixed military infrastructure, such as ports, airfields, and logistical sites. Indeed, more officers felt strongly about the security of fixed facilities than about the security of carrier battle groups—

60. Indeed, the U.S. military imposes no formal requirements for knowledge about military threats outside of an officer's tactical-technical specialty, so a widespread lack of understanding of foreign ballistic and cruise missiles should not be surprising. The requirements for joint professional military education are contained in *Chairman of the Joint Chiefs of Staff Instruction 1800.01A* (Officer Professional Military Education Policy), which contains no specific requirements for joint officer knowledge of threat issues.

despite focus group participants attributing the security of a carrier battle group largely to its mobility.⁶¹ The attitudes of intelligence officers were virtually indistinguishable from those of the overall survey population. Senior and flag officers were slightly more concerned about the threat than were junior officers, perhaps because they had a better understanding of foreign capabilities.

One of the most interesting insights on this topic was the considerable difference between U.S. and foreign perceptions of the ballistic and cruise missile threat. In each case, it appears that friends and allies of the United States see U.S. forces as more vulnerable than do U.S. officers. For example, although only 11 percent of U.S. officers believed that future adversaries would be able to attack carrier battle groups with ballistic and cruise missiles, 34 percent of foreign officers agreed. And whereas only 8 percent of U.S. officers saw forward bases as vulnerable to attack, 29 percent of foreign officers agreed. At face value, this reflects a belief among U.S. friends and allies that American forces and forward bases are at risk of being destroyed or put out of service by ballistic and cruise missiles. The potential operational and strategic implications of this disparity of opinions between U.S. and foreign officers with respect to U.S. force vulnerabilities are worthy of deeper exploration.

CHARACTER AND DEPTH OF CHANGE REQUIRED

Finally, we asked officers to evaluate the character and depth of change that the U.S. armed forces require to meet the changing security environment, and to evaluate service efforts to transform. Most officers are uncertain regarding what needs to be done for the U.S. military to compete effectively with future adversaries (see Table 10). There is notably strong uncertainty over the issue of whether “radical” change is required, and whether such change is currently under way.⁶² This suggests that a large percentage of the officer corps is not confident in its understanding of how technology might change the conduct of warfare—and what changes to systems, concepts, and organizations might be desirable or necessary.

61. One major reason for the disparity is likely the use of the term “destroy” rather than “attack.” Focus group participants expressed almost universal skepticism that a port or airfield could be destroyed in the sense that such a facility could be “put out of existence” or rendered “totally unusable.” Participants commonly said, however, that they tended to interpret the term “destroy” to simply mean “deny use” for a significant period of time. Whether the broader survey participants had the same interpretation is unknown.

62. Nowhere in the survey did we offer a suggestion of what “radical” might mean.

Table 10. Character and Depth of Change Required.

Statement	Agree	Disagree	Uncertain
The U.S. armed forces must radically change their approach to warfare to compete effectively with future adversaries.	47%	41%	64%
The U.S. armed forces are currently embarked upon a path that will lead to a radical change in military technology, doctrine, and organization.	48%	33%	71%
My Service should reduce its force structure to invest in new approaches to warfare.	16%	77%	57%
My Service should reduce its readiness to invest in new approaches to warfare.	9%	87%	22%
My Service is serious about exploring new approaches to warfare.	72%	19%	52%
Other Services are more serious than mine about exploring new approaches to warfare.	22%	44%	69%

Officers were evenly divided as to whether “the U.S. armed forces must radically change their approach to warfare to compete effectively with future adversaries.” Perhaps more significant was that 64 percent of respondents leaned toward uncertainty. Marine Corps officers believed most strongly in the need for radical change, with 56 percent agreeing with the statement; Navy officers saw the least need to change, with 41 percent in agreement.

An important aspect of this statement is that it portrays radical change as necessary for the U.S. military to remain competitive with future adversaries. The implication is that if the U.S. military does not change radically, it will cease to be competitive. It is significant that more than half of the officers either agreed with this conclusion or were uncertain. Less than half believed that the U.S. military could remain competitive without radical change, and only one in five believed strongly that radical change was not required. This would appear to contradict earlier responses indicating that officers were not concerned with the ability of adversaries to deny the United States the use of information networks or interfere with U.S. power projection capabilities.

Nearly half of the officers surveyed believed that the U.S. armed forces were on a path that will lead to radical change—nearly the same number as those

who believed that radical change was required. Seven in ten, however, leaned toward uncertainty on this issue—the highest such response in the entire survey. It therefore appears that the Defense Department leadership had thus far failed to make a compelling case to the vast majority of officers regarding the merits of military transformation.

Army officers expressed the greatest confidence that the U.S. armed forces were on a path that will lead to radical change; Navy officers were least convinced (see Table 11). There was also a correlation between an officer's rank and his view of whether the U.S. armed forces were in the midst of radical change: the higher an officer's rank, the less confident and more uncertain he tended to be.

Among focus group participants, Army officers believed most strongly that the U.S. armed forces were moving toward radical change. Navy officers fell squarely in the midrange, and Air Force and Marine Corps officers were predominantly in disagreement. The Army officers tended to believe that radical change could be accomplished with current dominant ground systems (such as the M1 Abrams main battle tank)—or with new types of manned, armored vehicles (such as the Future Combat System). Marine Corps officers tended to believe that radical change implied a much higher degree of jointness than had yet been achieved, or was likely. Air Force officers tended to equate radical change with developments that substituted technology for human functions (such as completely autonomous weapon systems). Most saw such developments as inevitable, but characterized the current pace as slow evolution (one termed it “glacial”) rather than rapid revolution. Navy officers were decidedly ambivalent on this issue, with some seeing ongoing plans for major crew reductions on surface ships as radical, and others deeming as radical widespread substitution of unmanned for manned systems.

Nearly half of the officers surveyed believed that what the services were doing, or were planning to do, in mid-2000—prior to the election of George W. Bush and the appointment of Donald Rumsfeld—could be characterized as a radical departure from the systems, operational concepts, and organizations that were dominant in the 1990s. This suggests something of a “dialogue of the deaf” between advocates of truly radical change—that is, a major departure from existing systems, concepts, and organizations—and the large percentage of officers who believed that radical change either was, or might be, already ongoing. This helps to explain the reported friction surrounding the Bush administration's plans to transform the U.S. armed forces between Secretary of

Table 11. The U.S. armed forces are currently embarked upon a path that will lead to a radical change in military technology, doctrine, and organization.

	Agree	Disagree
Overall	48%	33%
Army	52%	28%
Marine Corps	46%	39%
Navy	36%	42%
Air Force	44%	41%
Junior/Field-grade officers	50%	31%
Senior officers	41%	39%
Flag officers	37%	33%

Defense Rumsfeld and other civilian leaders of the Defense Department, on the one hand, and military leaders, on the other.⁶³

To gauge the officers' willingness to sacrifice to develop new ways of war, we asked them whether they would be ready to cut force structure or readiness to invest in new combat methods. Presumably if new ways of war offer a decisive battlefield edge, as noted above, then officers should be willing to trade force size or readiness to achieve such a capability. Yet more than three-quarters of officers disagreed with the contention that their service should reduce its force structure to invest in new approaches to warfare. Fifty-seven percent leaned toward strong disagreement, whereas only 35 percent tended toward uncertainty on the issue. The statement did not provide for any reduction in missions or current commitments, and so a reduction in force structure might have been interpreted as simply infeasible. Nevertheless, these responses track with the fact that nearly half of the officers believed that radical change was already ongoing—without any reduction, or need for reduction, in force structure.

Marine Corps officers were most adamantly opposed to reducing force structure to invest in new ways of war, with only 6 percent in favor. Junior and field-grade officers were more strongly opposed to reductions in force structure than senior and flag officers. They may equate cuts in force structure with reduced opportunities for promotion and command; postcommand senior and flag officers are presumably less motivated by such concerns. Senior officers

63. See, for example, Thomas E. Ricks, "Rumsfeld on High Wire of Defense Reform," *Washington Post*, May 20, 2001, p. 1.

may also see opportunities to reduce force structure to field a smaller—but more capable—force.

Respondents were even more adamant in their rejection of the proposition that their service should reduce its readiness to invest in new approaches to warfare. In fact, this statement elicited the strongest negative response of any in the survey, with more than half of the officers responding in extreme disagreement. Nearly three-quarters of the officers leaned toward strong disagreement, whereas less than one in four tended toward uncertainty. Marine Corps and Navy officers were particularly averse to reducing readiness to invest in new approaches to warfare. Flag officers, however, were slightly more willing to contemplate such trades than junior or senior officers.

A similar statement was put to the focus group participants, but with the stipulation that commitments would be reduced commensurate with a reduction in readiness.⁶⁴ They still rejected the proposal overwhelmingly. Respondents indicated that they tended to equate readiness to basic unit training and equipment availability across their service—and did not feel that there was any margin for reductions in these areas regardless of the level of force commitment. Moreover, these responses corroborate the view, expressed earlier, that nearly half of the officers surveyed believed that radical change was already ongoing without any need for a reduction in force readiness.

Nearly three-quarters of the officers believed that their service is serious about exploring new approaches to warfare, suggesting a high level of confidence in their own service. More than half, however, leaned toward uncertainty. The implication is that most officers were confident that their own service is serious about innovation, but there was a relatively high level of uncertainty as to what would be required for a “new approach” to warfare, what their own service was doing in this area, and how serious it really was about change.

At least two-thirds of officers of each service believed that their service was serious about exploring new approaches to warfare. Marine Corps officers were strongest in their belief, with 95 percent in agreement. By contrast, 67 percent of Navy officers believed that their service was serious about examining new approaches to combat.

More than four in ten officers expressed confidence that their own service was no less serious about innovation than any of the others. Nearly seven in

64. The question was, “Assuming commitments are reduced, should your Service reduce its readiness to invest in new approaches to warfare?”

ten, however, leaned toward uncertainty, indicating that there was a general lack of knowledge as to what other services are doing with respect to innovation, but also a good deal of confidence among officers that their own service could not be less innovative than any of the others.

More than eight in ten Marine Corps officers were convinced that no service was more serious about exploring new ways of warfare than theirs; only 5 percent agreed that other services were more committed than the Marine Corps. Army officers were the most uncertain about the commitment of other services. Also of note, flag officers—who presumably know the most about other services—had more confidence that their service was most serious about exploring new ways of war than did junior or senior officers.

Conclusions and Implications

It is clear from their public statements and the goals of the 2003 Transformation Planning Guidance document that the Bush administration is committed to fundamental changes in current and planned military forces, changes that would appear to require a transition to very different weapons, operational concepts, and organizations. The active support of the officer corps—the ultimate leaders and practitioners of the new ways of war—would seem to be important to this process.

Officer attitudes toward transformation defy easy characterization. On the one hand, the U.S. officers we surveyed were highly supportive of information age ways of war, at least in the abstract. Large majorities believed that forces employing information age technology, doctrine, and organizations would enjoy a substantial edge over those that do not and that new ways of war would give the United States dominance over the full range of adversaries. A majority predicted that information age ways of war will make it easier to use force with decisive results and a reduced risk of U.S. casualties. They also believed strongly in the growing importance of space and cyberspace. A large number felt that the U.S. military either was, or might be, undergoing radical change to information age ways of warfare.

Exactly what “radical” change is, however, is open to interpretation. The officers we surveyed tended to equate transformation with marginal improvements to current weapons and doctrine rather than the development of fundamentally new capabilities that Secretary of Defense Rumsfeld has called for. A majority believed that currently dominant systems—tanks, manned aircraft, and aircraft carriers—would be as important in twenty years. And the vast ma-

jority were unwilling to reduce force structure or readiness to invest in new approaches to warfare. Indeed, such statements garnered the strongest negative responses of the survey. Perhaps because many officers already believed that radical change was already under way, they saw no reason to trade force structure or readiness for investment in new approaches to warfare.

Our research revealed an officer corps that was confident if not complacent. The officers we surveyed expressed great confidence in the ability of the U.S. armed forces to deal effectively with threats to U.S. bases, power projection forces, and information networks and were not persuaded of the need for radical change to meet them. They may have been unaware of current and projected threats or might have believed that current programs were sufficient to deal with these challenges.

Above all, we found that a very large segment of the officer corps was uncertain about both future military challenges and the requirements for a transformed force to deal with those challenges. It is unclear whether the vast majority of officers have had an opportunity to think about military transformation. Seven in ten, for example, were unsure whether the U.S. military was on a path that would lead to radical change. They appeared receptive to the notion that the U.S. military is experiencing a revolution in military affairs, but remained unconvinced as to whether the U.S. armed forces were exploiting it.

What accounts for these attitudes? Our project yielded results supporting the proposition that both service culture (expressed through service and branch affiliation) and an officer's experience (expressed through rank and combat experience) shape attitudes. More than fifteen years after the Goldwater-Nichols Act, which was designed to make the U.S. armed forces more "joint," service affiliation remains the strongest determinant of officer attitudes that we could identify. Air Force officers proved to be the most enthusiastic about, and Army and Marine Corps officers were the most skeptical of, information-enabled and information-intensive ways of war, with Navy officers in between. Air Force officers were as a group the most supportive of the notion that the U.S. military is experiencing an RMA. Many believed that coming years would witness a reduction in the importance of currently dominant systems. Indeed, half predicted that manned aircraft would become less important—and unmanned systems such as the unmanned combat aerial vehicle more important—over time. They tended to feel most strongly that the information age would allow the United States to use force more easily, with greatly reduced chance of incurring U.S. casualties, and with a greater chance of achieving a decisive victory.

Army and Marine Corps officers were consistently more skeptical of the proposition that the U.S. military is experiencing a revolution in warfare than their Navy and Air Force counterparts. Army and Marine Corps officers who participated in the survey tended to feel most strongly that currently dominant weapon systems and organizations would be equally as important in the future. Conversely, they tended to be more skeptical than their Navy and Air Force counterparts that the information revolution is changing the character of warfare. They believed less strongly than other officers that the U.S. military is embarked upon a path of radical change. Indeed, they were the most doubtful of the need for the U.S. armed forces to change radically.

Navy officers were more skeptical than Air Force officers but more enthusiastic than Army and Marine Corps officers about the prospects for radical change. Not surprisingly, they held the strongest belief in the enduring importance of the carrier battle group. They also felt strongly, however, that information age ways of war would make it increasingly easy for the United States to use force and achieve decisive victories with substantially reduced risk of American casualties. Enthusiasm toward the RMA appears to be related to the service's reliance on advanced technology. In absolute terms, the U.S. armed forces utilize more information age technology than most foreign militaries. Not all services depend on hardware (and software) to the same extent, however. The U.S. Air Force relies most heavily on technology, followed by the Navy. The Army and Marine Corps are less technology-intensive services. It is hardly surprising, therefore, that Air Force and Navy officers are more enthusiastic than Army and Marine Corps officers about the ability of information age systems, doctrine, and organizations to change the character and conduct of warfare.

The conduct of recent conflicts may have reinforced these tendencies. Throughout the 1990s, the United States relied heavily on standoff, air-delivered weapons in combat. Air power—in the form of manned aircraft and unmanned cruise missiles—was the weapon of choice in Iraq and the Balkans. Moreover, the U.S. advantage in high-technology arms appeared to play a major role in its lopsided victory over Iraq in 1991 and Serbian forces in Kosovo in 1999. By contrast, conflicts with more ambiguous outcomes, such as Somalia and Haiti, involved ground forces. It is therefore hardly surprising that Air Force—and to a lesser extent Navy—officers believed more strongly than their Army and Marine Corps counterparts that the information revolution is changing the character of war.

It would be wrong to conclude that the Army and Marine Corps are impla-

cably hostile to the notion of major change in the character and conduct of war, just as it would be mistaken to view the Air Force as completely supportive. RMA proponents need to understand, however, that the services are likely to view transformation in very different terms. They would similarly be wise to tailor strategies for promoting innovation to each service's culture. An emphasis on new technology, for example, may resonate with the Air Force and to a lesser degree the Navy, but it is unlikely to garner much support within the Army or Marine Corps. Similarly, efforts to portray transformation in terms of radical or revolutionary changes in warfare are unlikely to appeal to members of the ground forces.

Officers believed strongly in the enduring importance of their branches. For example, while 51 percent of all officers felt that armored and mechanized formations would be as important in 2020 as they were in 2000, 72 percent of Army armor branch officers agreed with the statement. Similarly, 58 percent of the overall survey population, but 65 percent of aviators, believed that manned aircraft would be as important in twenty years. As a result, new combat methods that threaten a branch's identity are likely to trigger resistance.

Changing the culture of any organization is not easy. Changing the culture of an institution as large, complex, and deeply rooted as the U.S. military would be extremely difficult. Rather than seeking to change the culture of the services directly, advocates of change may want to find ways to innovate within existing cultures or foster new ones that are more supportive of change. In some cases, it may make sense to identify communities that are receptive to new ways of war within the existing structure of the services. Rather than trying to turn fighter pilots into UAV operators, for example, it might be worthwhile to turn to other aviation communities that are currently involved with intelligence, surveillance, and reconnaissance and already have cadres of trained pilots, mission commanders, and sensor operators. Rather than turning armor branch officers into light armored vehicle commanders, it might be worthwhile to consider infantry officers. In other instances, it may make sense to create new branches and career paths to support emerging warfare areas, much as the U.S. Navy did in the 1920s to foster the growth of naval aviation.

We also found that officers' experiences shape their attitude toward innovation. We hypothesized, for example, that an officer's rank would influence his attitude toward innovation. In particular, we speculated that lower- and middle-ranking officers were likely to be more enthusiastic about new ways of war than senior officers. In fact, we found that an officer's rank had a much less pronounced impact on his attitudes toward innovation than his service

affiliation. Moreover, in those instances where there were significant differences, senior officers tended to be more enthusiastic about new ways of war than junior officers. The higher an officer's rank, for example, the less his enthusiasm and the greater his uncertainty regarding the continued importance of currently dominant weapons.

The relationship between an officer's rank and his attitude toward innovation is thus a complex one. Having spent less time in uniform than their superiors, junior officers are likely less influenced by service culture. Junior officers, however, have a narrow base of experience on which they can draw. While they are experts in their specialty, they have little experience outside their branch or community. Moreover, most are quite naturally concerned with promotion and force command, opportunities that their service and branch control. Such concerns moderate any desire to challenge the conventional wisdom.

The picture is just as mixed when it comes to senior officers. On the one hand, they have had more time to become indoctrinated into their service's culture. On the other, they have served longer in the military and have had the opportunity to witness more change throughout their careers. They also have much greater experience outside their branch or service than junior officers.

The strongest base of support for transformation thus appears to come from the senior ranks. This should come as good news to advocates of innovation, as these officers are already or will soon be in positions to effect change. By contrast, it appears that junior officers do not see transformation as something that is important to them. Our focus groups show that although some junior officers think about new ways of war, few read professional journals and very few are sufficiently motivated to actually write about emerging ways of war. Advocates of change thus need to find ways to mobilize junior officers in support of change. They need to find ways of explaining the advantages of new approaches to combat in very tangible ways. They also need to put in place a system of incentives and rewards to draw the best and brightest young officers into new career paths.

We found no correlation between an officer's combat experience and his attitudes toward transformation. Nor did veterans of a particular conflict have views that differed from nonveterans. It may be that the veterans' combat experience did not prove particularly compelling. Or it may have affected different people in ways that on average offset one another. In either case, combat experience did not make officers noticeably more enthusiastic or skeptical toward innovation. Likewise, the extent to which current events shape officer attitudes could not be discerned from the survey data. Additional surveys may

provide some insight into whether and how officer attitudes toward transformation might be molded or changed by the terrorist attacks of September 11, 2001, the war on terrorism, the 2001–02 operations in Afghanistan, the 2003 invasion of Iraq, and North Korean nuclear threats.

Officers will undoubtedly view proposals for transformation that call for new dominant systems, operational concepts, and organizations—such as those contained in the Transformation Planning Guidance document—through the lens of their definition of the profession of arms. Officers will also judge proposals for change by how they will affect their own career prospects. There is a natural tendency within the officer corps to avoid change for change's sake, especially to a military that has experienced resounding battlefield success. If, as hypothesized, the officer corps is critical to the transformation process, then there is good news for the administration in the evidence that most officers appear genuinely open to a good argument for transforming the force. The bad news is that as of mid-2000 most officers had either not heard a compelling argument for such change, or were simply unaware of the issue. Moreover, the tremendous battlefield success of U.S. military forces in Afghanistan and Iraq in 2001 and 2003, respectively, may have generated additional skepticism of the need for near-term and radical change.

It is too early to tell whether the Bush administration will be able to influence officer attitudes toward transformation. However, the lack of a truly compelling rationale for major change, and the absence of an effort to market that rationale to the broad officer corps, suggest little reason for transformation's advocates to be optimistic.