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# THINKING ABOUT INNOVATION

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**B**riefings by service representatives at recent conferences on military innovation suggest a great deal about what is wrong with the current efforts in the U.S. Department of Defense to foster innovation. One clearly evoked a mass Stakhanovite-like\* operation at that service's doctrine center, a program in which the entire staff, from the commander to the lowliest enlisted person, are working twelve hours a day, six days a week, to realize the service chief's vision of innovation.<sup>1</sup> That is unfortunate; it is inconceivable that any valuable thinking, much less progress toward substantial innovation, could be taking place under such conditions.

It is all too easy, in fact, to form the impression that none of the services are deeply serious about transformation, that little real thinking is occurring within the labyrinthine corridors of the Pentagon or the various agencies that make up the Defense Department's nervous system.<sup>2</sup> There is a great deal of talk in the Washington, D.C., area about transformation, innovation, and "revolutions in military affairs," but there is unfortunately little focus on the attributes of military (and other) organizations that have actually fostered significant, successful innovation over the past century.

Instead, even the most sympathetic onlooker is likely to sense that the Pentagon lives in a sea of slogans, briefings using elaborate electronic graphics, and a

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\* The (state-sponsored) Stakhanovite labor movement in the Soviet Union in the 1930s was characterized by centralized organization and very large individual work assignments.

self-satisfied belief that new platforms will solve the tactical and operational problems of the future. Unfortunately, slick presentations do not equate to serious military thought. Nor does the procurement of sophisticated—and therefore exceedingly expensive—weapons systems necessarily lead to a “revolution in military affairs.” In fact, technology has rarely been more than an enabler of revolutions in military affairs in the past, and there is no reason to believe that things will be different in the future.<sup>3</sup>

From the perspective of a military historian, there is no particular cause for surprise in that state of affairs—or, at least for the coming decade, for worry. What *is* troubling is the set of attitudes and cultures that characterizes U.S. military services at the beginning of what appears to be an extended period of peace. These are attitudes and cultures of a sort that may make real innovation, when it counts, impossible.

Ironically, the United States has been all too successful in its efforts to eliminate the threats that arose in the twentieth century to its national security interests. Entering World War I near the end of the conflict, it helped to bring victory on the Western Front in 1918 and thereby to prevent Kaiser Wilhelm’s Reich from establishing a general hegemony over Europe. Two decades later America’s military and industrial might wrecked both Nazi Germany (with the help of the Soviet Union) and imperial Japan in a successful two-front war.<sup>4</sup> Then, over the course of a cold war of nearly sixty years (for the Cold War really began in the late 1930s), the United States outlasted its ideologically motivated communist opponents; their economic systems finally collapsed. The difficulty is that the current framework of international politics is unlikely to last until the end of the twenty-first century, and the threats to American interests are likely to grow rather than diminish.<sup>5</sup>

## THE HISTORICAL PARAMETERS OF REVOLUTIONS IN MILITARY AFFAIRS

One of the factors that emerged in the last interwar period as a significant enabler of revolutions in military affairs was the fact that military organizations—which then had real, discernible threats against which to develop new capabilities and doctrine—invariably innovated more coherently and effectively than other entities. A case in point is the development of combined-arms tactics by the Germans. The German army spent much of the interwar period confronting threats in both the east and west represented by Polish, Czech, and French military forces.<sup>6</sup> Mobility and a careful refinement of the lessons of the last war eventually allowed the Germans to handle the immediate threats on their frontiers. However, the development of combined-arms warfare in a Central European setting was not sufficient for the worldwide war that was unleashed; the

Germans possessed neither the logistical or intelligence resources nor the strategic grasp necessary to wage war from the North Cape to the Mediterranean and from Stalingrad to the Caribbean.

Similarly, the U.S. Navy and the U.S. Marine Corps confronted in the 1920s and 1930s formidable problems in developing capabilities to fight a war over

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the distances involved in the Pacific Ocean.<sup>7</sup> For the Navy, the eventual result was the development of carrier aviation in a way that would significantly extend the reach of the fleet.<sup>8</sup> In the case

of the Marines, the need to capture logistical bases to support the projection of naval and air power across the ocean led to the development of amphibious tactics and capabilities. The Navy, which required island bases to support its own advance across the Pacific, recognized the need to assist the Marines.

The problem that the U.S. services confront today is that they cannot assess when, where, or against whom a future war might occur, or even how long it might last.<sup>9</sup> There is simply no discernible threat, even on the distant horizon, against which the United States can now measure its forces or its capabilities. The implications are profound, because they make real innovation especially difficult. In the interwar period, those military organizations, like the Royal Air Force and the U.S. Army Air Corps, that developed “generic” capabilities—that is, not focused upon specific projected missions—created doctrinal and operational concepts that were fundamentally flawed. The evidence suggests that ambiguity resulted in dangerous assumptions—for example, about the ability of strategic bomber formations to defend themselves.

But it is not only the uncertainties of the future strategic environment that raise problems for the American military. One of the major advantages that the services enjoyed in the 1920s and 1930s was the fact that that period of peace lasted no longer. Thus, the senior leaders who went to war in 1939 were all experienced combat officers who had studied definable tactical, and in some cases operational, problems on the basis of real-world combat experience. Today’s American military confronts a peace that could last well into the century. The last significant war that the U.S. military fought was the Vietnam conflict; already, few even in the flag and general-officer ranks served in that traumatic war.<sup>10</sup> A long peace, one that lasts forty or fifty years, could well create military cultures that no longer understand the fundamental nature of war, in which planners assume that there will be little friction or that opponents will be unable to interfere with the conduct of operations.<sup>11</sup>

Certainly, the Royal Navy's history in the period from 1815 through 1914 suggests some of the professional pitfalls of a prolonged period of peace.<sup>12</sup> That military organization, primed by the decades of naval war against the fleets of the French revolutionaries and Napoleon, had come to rely on the willingness and ability of subordinate commanders—exemplified by Admiral Horatio Nelson's "band of brothers"—to discern and respond independently to the dictates of a situation. But in the decades after 1815 the Royal Navy, facing few demands more pressing than polishing brass and making a good impression, gradually changed into a service whose senior officers at Jutland refused to fire on German ships at virtually point-blank range because they had received no orders from their superiors—and neglected to inform those superiors that they had the enemy in sight.

The basic problem is that military organizations can rarely replicate in times of peace the actual conditions of war. It becomes increasingly easy, as the complexities, ambiguities, and frictions of combat recede into the past, for militaries to develop concepts, doctrines, and practices that meet the standards of peacetime efficiency rather than those of wartime effectiveness. There is no other profession in the world whose peacetime efforts represent only a pale shadow of the harsh realities in which its men and women must carry out their true functions—not least that their opponents are trying to kill them. That is why the profession of arms is the most demanding calling not only physically but intellectually. It is also why professional military education has been so profoundly important to armed services in preparing for and waging war. Here lies perhaps the greatest weakness in the current culture of the American military.

With perhaps a single exception, the colleges of professional military education, charged with educating the officer corps for the complexities and ambiguities of the future, are not especially distinguished. In 2000, a very senior officer told an assemblage at a war college that he hoped its students were getting to know their families and playing plenty of softball and golf, as he had himself when he attended that same institution. At least some of the better students were outraged. It is well to remember, as a contrast, that in the interwar period individuals who were to rise to the highest levels in the coming war had been on the *faculties* of the war colleges; examples include Raymond Spruance (who served two tours on the faculty of the Naval War College at Newport and returned after the war to become its president), Richmond Kelly Turner, J. Lawton Collins, W. H. Simpson, and Alexander Patch.

Exacerbating the problem of successful innovation over the past century has been the harsh reality that military organizations have rarely been willing to learn from the past. It is a myth that military organizations tend to do badly in each new war because they have studied too closely the last one; nothing could

be farther from the truth. The fact is that military organizations, for the most part, study what makes them feel comfortable about themselves, not the uncongenial lessons of past conflicts. The result is that more often than not, militaries have to relearn in combat—and usually at a heavy cost—lessons that were readily apparent at the end of the last conflict.

To take an example from the British: by summer of 1918 the Royal Navy had evolved a complex set of technologies and tactics that allowed its antisubmarine

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forces to respond effectively to the threat of the U-boats. Convoys, air support (including night-flying aircraft equipped with searchlights), trained escort groups, and

technological support had all become available. When the next war began in September 1939, however, the Royal Navy had virtually none of these capabilities. The result was the nightmarish Battle of the Atlantic, wherein the British had to struggle desperately to keep up with a U-boat force that was inflicting terrible losses on the merchant shipping that was the lifeline of their island nation.<sup>13</sup>

We have already noted the flawed concepts and doctrine developed between the wars by the Royal Air Force and the U.S. Army Air Corps. Interestingly, both had rejected the lessons of the last war in their thinking. Yet in retrospect, World War I had clearly underlined two basic facts about air war: first, air superiority is essential to the successful employment of aircraft for any other mission; second, it is very difficult for aircraft to hit targets accurately, even under the conditions of daylight and good weather.<sup>14</sup> In the case of the Royal Air Force, the rejection of recent experience was explicit; for the Army Air Corps, it was implicit.<sup>15</sup> Certainly, the rapidity of technological change confronted airmen with troublesome ambiguities. But the far more impressive level of innovation that the Luftwaffe achieved in preparing for World War II—innovation that rested on a careful analysis of the past—suggests that many of the problems that confronted American and British air forces were self-inflicted, arising from contempt for the lessons of the past (even the immediate past) in a rush to get on with the future.<sup>16</sup>

The unwillingness to learn from the past carried on into the next war. The RAF spent much of the first two years of the war killing German cows and blowing up trees, because of its lack of blind-bombing aids. Not until late summer 1941 did the Butt Report make clear that barely one-third of Bomber Command's aircraft were capable of hitting within five miles of their targets (that is, an area of seventy-five square miles).<sup>17</sup> For their part, U.S. airmen dismissed the warnings implicit in the Battle of Britain about the vulnerabilities of bomber formations; it took not one but two Schweinfurt raids and the loss of hundreds

of bombers before Eighth Air Force's leadership gave long-range escort fighters top priority.

There were, however, organizations that did learn from the past. Unfortunately, the foremost of these was the Reichsheer, the successor to the German army of the First World War. The Reichsheer's first chief, General Hans von Seeckt, noted soon after assuming command, "It is absolutely necessary to put the experiences of the war in a broad light and collect this experience while the impressions won on the battlefield are still fresh and a major proportion of the experienced officers are still in leading positions."<sup>18</sup> As one of his first steps Seeckt ordered a sweeping examination of the lessons of the last war, establishing fifty-seven committees to carry out that task. Seeckt gave these committees explicit terms of reference; they were to produce

short concise studies on the newly gained experiences of the war and consider the following points: a) What new situations arose in the war that had not been considered before the war? b) How effective were our prewar views in dealing with the above situations? c) What new guidelines have been developed from the use of new weaponry in the war? d) Which new problems put forward by the war have not yet found a solution?<sup>19</sup>

The result was that the Germans developed a thorough understanding of the combined arms-related implications of the war. That historical understanding infused both their 1923 Field Service Regulations and the 1932 basic doctrinal manual *Die Truppenführung*, the finest exposition of the nature of war at the operational level ever written.

It is well worth underscoring the contrast here between the British and German armies: the British failed to establish a committee to study the lessons of World War I until 1932. At that time, the chief of the Imperial General Staff gave it a toughly worded task: the committee was to "study the lessons of the late war, as shown by the various official accounts, and to report whether these lessons are being correctly and adequately applied in our manuals and in our training generally."<sup>20</sup> Unfortunately, the committee produced a report that was highly critical of the army's performance in the war, and a new chief of the Imperial General Staff, General Sir Archibald Montgomery-Massingberd, quashed it; he ordered that a far more favorable study be issued to the officer corps. Thus, the British army never gained any insight into what had gone wrong in the last war. Three long years of defeat would ensue before Bernard Law Montgomery assumed command of Eighth Army in Egypt and began to grapple with the systemic prewar problems that still were affecting his command's performance on the field of battle.<sup>21</sup>

There is another crucial element in the innovation equation—the culture of military organizations. By and large, historians devote little attention to the

subject; yet it may be the most important enabler of military innovation. The services that innovated with considerable success in the interwar period possessed internal cultures that encouraged debate, study, and honest experimentation in their preparations for war. Professional military education was clearly a

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part of the process; so was serious study and writing outside of the schoolhouse. Erwin Rommel, the preeminent “muddy-boots” soldier in the German army, not only read books but wrote them.<sup>22</sup> Further, military cultures that inno-

vated well cultivated substantive exchanges about the significant military issues of the day. The German army particularly encouraged its officers to engage in serious debate, and in print. In contrast, its future opponent across the Rhine was elevating doctrine to the stature of dogma. In the mid-1930s General Maurice Gamelin, the French army’s commander in chief, established the high command as the sole arbiter for doctrinal matters; all lectures, articles, and books by serving officers had to receive its prior approval. As the French general André Beaufre later noted in his memoirs, “Everyone got the message, and a profound silence reigned until the awakening of May 1940.”<sup>23</sup>

Still, history as measure of the parameters of innovation can be quite misleading; the impression historians form can depend on the cases they select and the contemporary sources they consult. The devastating victory of German forces in the campaign against France in 1940 would seem as clear a “revolution in military affairs” as any in the twentieth century. Yet virtually none of the German generals responsible felt there was anything revolutionary in that victory. In fact, one of the most perceptive General Staff officers, General Erich Marcks—soon to be selected by the army’s chief of staff, Franz Halder, to draw up the initial plan for the invasion of the Soviet Union—noted in his diary in late June 1940 as the major explanation of the success in France the ideological motivation of German soldiers.<sup>24</sup> On the other side of the hill, however, his counterparts in the British and French armies clearly believed that something revolutionary had occurred.

Why the difference in perception? To German officers the changes that had taken place between 1920 and 1940 appeared to be evolutionary; many of these individuals had been part of the process, step by step. British and French officers, on the other hand, their own armies having evolved at a slower pace or in entirely different directions, saw in 1940 what seemed a victory of revolutionary magnitude.

The only truly sudden, discontinuous change in the interwar period on what would be the Allied side appears to have been the creation of Fighter Command, under the leadership of Air Marshal Sir Hugh Dowding from 1937 through 1940.<sup>25</sup> Still, in technological matters Dowding drew on decisions he had made earlier in the thirties, when he had directed the RAF's research and development efforts. In that position he had set the specification for the single-engine, high-performance fighter designs that became the Spitfire and the Hurricane, and he had backed experiments in radio direction finding that would produce radar. Furthermore, the British had created in World War I, by summer 1918, an effective air defense system to oppose German strategic bombers; the concept of a *system* of air defense remained embedded in RAF thinking in the late 1930s and provided a mental framework for creating a counter to the new threats.

#### PROSPECTS FOR INNOVATION IN THE NEXT CENTURY

What does all this history have to do with the current state of innovation in the U.S. military? In effect, it is a benchmark against which one can measure the trends and the attitudes of its officer corps and senior leadership as to their likely receptiveness to innovation and the major conceptual changes to come in the next decades. In some respects such a report card on the present state of the U.S. military would be quite positive, particularly in regard to current threats. Its marks would not be so good on long-range prospects for innovations on the order of those of the 1920s and thirties.

In the day-to-day business of training and preparing military forces to face current and immediately foreseen threats, the American armed services remain far ahead of any conceivable opponent. Such facilities and programs as "Red Flag," "Top Gun," the National Training Center, and fleet battle experiments all provide realistic, tough challenges for assessing the readiness of units and the suitability of new concepts. While these facilities cannot replicate the conditions of combat, they do provide a framework for preparing for combat in a way that is superior by an order of magnitude to anything available in previous decades. This state of affairs is encouraging, because the historical record suggests that at the heart of innovation lie discrete, specific problems. Only by beginning with such issues have military organizations been able to realize their larger visions and exploit the capabilities inherent in technological change.<sup>26</sup>

Yet there are also worrisome trends. The military services, with the exception of the Marine Corps, reflect the attitudes of the American people in being profoundly ahistorical.<sup>27</sup> The "revolution in military affairs" has been to some extent advocated by people who are disturbingly ignorant of history.<sup>28</sup> The

emphasis within the services has been, more often than not, on technology and platforms, as embodying in themselves the necessary direction of innovation. But even more distressing has been the reemergence of the mechanistic, engineering, systems-analysis approach to thinking about future war that so characterized Robert Strange McNamara's Pentagon in the 1960s. The catastrophic result of that secretary of defense's approach was the waging of the Vietnam War by an American military that consistently refused to recognize the human factor in warfare.<sup>29</sup>

However, most of the lower-ranking and mid-level officers who fought (and survived) in Vietnam returned with the uncertainties and ambiguities of war burned into their souls.<sup>30</sup> Accordingly, much of the development of the U.S. mil-

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itary between 1975 and 1990, as it adapted to an increasing pace of technological change, reflected the lessons learned at such cost in Southeast Asia. It is not that those

seared by the experience of Vietnam rejected technological change; the new weapons systems and technological capabilities introduced in the years of their ascendancy reflect their understanding that technology would provide important leverage against the Soviets. But they also understood that technology was only an enabler: what really mattered in combat, they were convinced, were the doctrine and conceptualizations within which technology was to be employed. One result was a series of doctrinal publications that were the best ever produced by the American military. The 1986 edition of the Army's Field Manual 100-5, as well as the Marine Corps's Fleet Marine Force Manual 1, *Warfighting*, represented a deep understanding of the fundamental nature of war.

Today, that understanding appears in danger of dissipating, notwithstanding the even more Clausewitzian statement issued by the Marines under General Charles C. Krulak. In 1992 the Army published a considerably watered-down version of FM 100-5, and its concurrent efforts to draft a post-Cold War view of the operational level of war floundered in the late 1990s. The 1998 revision of Air Force Manual 1-1 was extraordinarily weak, a jumble of assertions, pictures, and dogma—a manual more concerned with style than substance, a pale shadow of the far more substantive manual published in the early 1990s.

In the larger sense, it is the cultures of the services that constitute the greatest cause for alarm. The American armed services remain alone among "First World" militaries in not making intellectual, along with operational and tactical, accomplishments prerequisites for senior command.<sup>31</sup> As one senior officer has suggested, American officers with substantial academic attainment have to *prove* that they are "muddy-boots" soldiers or "blue-water" seamen, etc., but the latter do not have to prove they have brains.

Part of the problem is that the service personnel systems are so constrained by laws drawn up in the late 1940s, as well as by more recent service practices and congressional mandates, that it is virtually impossible for young officers to find time and opportunity to attain the broad spectrum of historical knowledge, language training, and cultural awareness that the twenty-first century is going to demand. The officer corps of the U.S. armed services are therefore likely become ever more narrowly technological and less capable of adapting and innovating in the face of diverse threats and emerging challenges.<sup>32</sup> For successful innovation in the coming decades, as in the past, it will be the ability to conceptualize that matters.

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#### NOTES

1. This view of innovation contrasted sharply with that of two senior Army officers (who had been leaders in the renaissance of the late 1970s) who suggested in a conference at the Army War College in March 2000 that a crucial element in innovation was to form small, carefully picked groups to work on substantive doctrinal and conceptual issues.
2. For all the talk about how important transformation and innovation are to the future capabilities of the U.S. military, the chief intellectual positions in that process, those of the presidents and commandants of the war and staff colleges, seem often to be filled as afterthoughts—in the case of the National War College, on the basis of which service's turn it is, in the "joint world," to hold that three-star position
3. For a discussion of the role of technology in the processes of innovation and the creation of "revolutions in military affairs," see Barry Watts and Williamson Murray, "Military Innovation in Peacetime," in *Military Innovation in the Interwar Period*, ed. Williamson Murray and Allan R. Millett (New York: Cambridge Univ. Press, 1996).
4. For the role of the United States in World War II, see Williamson Murray and Allan R. Millett, *A War to Be Won: Fighting the Second World War* (Cambridge, Mass.: Belknap Press of Harvard Univ. Press, 2000).
5. See in particular Williamson Murray, "The Emerging Strategic Environment: An Historian's Thoughts," *Strategic Review*, Winter 1999.
6. See Williamson Murray, "Armored Warfare," in Murray and Millett, eds., *Military Innovation in the Interwar Period*, chap. 1.
7. *Ibid.*, chaps. 2 and 10.
8. See in particular Thomas C. Hone, Norman Friedman, and Mark D. Mandeles, *American and British Aircraft Carrier Development* (Annapolis, Md.: Naval Institute Press, 2000).
9. For how well the American military is addressing the emerging threats, see Williamson Murray, "Preparing to Lose the Next War?" *Strategic Review*, Spring 1998.
10. For the impact this is already having on the American military, see Williamson Murray, "Clausewitz Out, Computer In, Military Culture and Technological Hubris," *National Interest*, Summer 1997.
11. As early as spring 1996 this author heard a senior Army general suggest to a war college class that "the digitization of the Army spells the end of Clausewitz."
12. For the deleterious effects of long interwar periods, see Andrew Gordon and John Woodward, *The Rules of the Game: Jutland and British Naval Command* (London: James Murray, 1996).
13. See Murray and Millett, *A War to Be Won*, chap. 10.
14. See Williamson Murray, *The War in the Air, 1914–1945* (London: Cassell, 1999), chap. 1.

15. In 1924 the RAF's air staff produced a memorandum arguing that forces attacking an enemy nation "can either bomb military objectives in populated areas from the beginning of the war, with the objective of obtaining a decision by moral effect which such attacks will produce, and by the dislocation of the country, or, alternatively, they can be used in the first instance to attack enemy aerodromes with the view to gaining some measure of air superiority, and when this has been gained, can be changed over to the direct attack on the nation. The latter alternative is the method which the lessons of military history seem to recommend, but the Air Staff are convinced that the former is the correct one." Public Records Office, AIR 20/40, Air Staff Memorandum 11A, March 1924.
16. For Luftwaffe preparations see Williamson Murray, *Luftwaffe* (Baltimore: Nautical and Aviation, 1985), chap. 1.
17. For the Butt Report see Sir Charles Webster and Noble Frankland, *The Strategic Air Offensive against Germany*, vol. 4, *Appendices* (London: H.M. Stationery Off., 1962), app. 13, p. 205.
18. Quoted in James S. Corum, *The Roots of Blitzkrieg: Hans von Seeckt and German Military Reform* (Lawrence: Univ. Press of Kansas, 1992), p. 37.
19. *Ibid.*
20. Quoted in Harold R. Winton, *To Change an Army: General Sir John Burnett-Stuart and British Armored Doctrine, 1927–1938* (Lawrence: Univ. Press of Kansas, 1988), p. 127.
21. The appalling defeat in the Gazalla battles in May–June 1942 against Rommel underlined these defects clearly.
22. For the best biography of Rommel, as the thinking soldier as well as the man of action, see Sir David Fraser, *Knight's Cross: A Life of Field Marshal Erwin Rommel* (New York: HarperCollins, 1993).
23. André Beaufre, *1940: The Fall of France* (London: Cassell, 1967), pp. 36–7, 45.
24. Marcks commented, "The change in men weighs more heavily than that in technology. The French we met in battle were no longer those of [the years] 14/18. The relationship was like that between the revolutionary armies of 1796 and those of the [First] Coalition—only this time we are the revolutionaries and Sans-Culottes." Quoted in MacGregor Knox, *Common Destiny, Dictatorship, Foreign Policy, and War in Fascist Italy and Nazi Germany* (Cambridge, U.K.: Cambridge Univ. Press, 2000), p. 186.
25. See Alan Beyerchen, "From Radio to Radar: Interwar Military Adaptation to Technologic Change in Germany, the United Kingdom, and the United States," in Murray and Millett, eds., *Military Innovation in the Interwar Period*, chap. 7. For Dowding's prewar view of the threat, see Sir Hugh Dowding, "Employment of Fighter Command in Home Defence," intro. and annotations by John Monsarrat and Robert S. Staley II, *Naval War College Review*, Spring 1992, pp. 35–50.
26. I am indebted to Colonel Rick Sinnreich, USA (Ret.), for this point.
27. See MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolution, 1300–2050* (forthcoming from Cambridge Univ. Press, 2001).
28. See William A. Owens and Edward Offley, *Lifting the Fog of War* (New York: Farrar, Straus, Giroux, 2000), pp. 73–9, 102–15, for astonishing misstatements of historical fact—including the first names of generals.
29. The best critique of the American conduct of the war remains Andrew Krepinevich, *The Army and Vietnam* (Baltimore: Johns Hopkins Univ. Press, 1986).
30. See Murray, "Clausewitz Out, Computer In."
31. On professional military education see Leonard Holder [Lt. Gen., USA (Ret.)] and Williamson Murray, "Prospects for Military Education," *Joint Forces Quarterly*, Spring 1998.
32. This trend increasingly affected the General Staff in the late nineteenth and early twentieth centuries and caused the Germans significant difficulties in the first years of World War I.



Looking toward Luce Hall from the Mahan Rotunda