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# JOINT CONCEPT DEVELOPMENT AND EXPERIMENTATION

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Thank you, Mr. Chairman, for the opportunity to appear before you today, and to share my views on this important issue. My testimony is intended to provide a context within which one might assess Joint Forces Command's (JFCOM's) mission for joint concept development and experimentation in the wake of the command's disestablishment.

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I proposed the idea of transforming Atlantic Command (ACOM) into Joint Forces Command and assigning it primary responsibility for U.S. military transformation while serving on the National Defense Panel. My colleagues on the Panel strongly shared my view that such a command is needed owing to the rapidly changing character of the military competition, stimulated by the accelerating tempo of technological advances and an international system in a state of flux. We proposed JFCOM with the understanding that its commander would be the sole senior officer whose primary mission was to speak for and support the "COCOMs-after-Next" (i.e., the COCOMs that would assume their commands 5-10 years in the future).[1]

The command would accomplish this mission by identifying major emerging threats to our security as well as opportunities for addressing them. The goal was to anticipate threats and prepare for them, rather than having to react to them once they are upon us. On paper, this remains a central JFCOM mission. Today JFCOM's commander remains the only COCOM commander with a primary responsibility for positioning the U.S. military for the long-term future.

However, in reality, preparing for emerging challenges to national security has become a secondary mission, at best, both for the command and its commander. Established with the conversion of Atlantic Command to Joint Forces Command in 1999, JFCOM assumed responsibility for concept development and experimentation—the "futures" mission.

1 See NDP, *Transforming Defense: National Security in the 21st Century* (Washington, DC: National Defense Panel, December 1997), pp. 68–72.

Efforts to sustain the command's focus on providing a voice for the COCOMs-after-Next were hampered in 2003 when JFCOM's commander was assigned the responsibility as Supreme Commander, Allied Command Transformation.

In a sense, JFCOM has never fully liberated itself from its Atlantic Command ancestor. One might argue that it has always remained ACOM. JFCOM's *de facto* priority missions are "joint force provider" and "joint force trainer." These missions were assigned to ACOM in 1993, when it was given responsibility for conducting joint training of assigned CONUS-based forces, and preparing for review by the JCS Chairman joint force packages for worldwide employment. Indeed, JFCOM has been a magnet for Pentagon flotsam and jetsam organizations, and is sometimes referred to as "Velcro Command." The result has been a command being pulled in different directions and lacking overall focus. The mission that inspired its creation—joint concept development and experimentation—has been progressively marginalized.

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Why are concept development and experimentation—properly done—so important? The matter merits some elaboration, and history offers an excellent guide. For over a century wargaming (and more recently simulations), along with other analytic tools, have played important roles in identifying new military systems and force elements, while also providing key insights needed for developing new operational concepts as well as weeding out those that have serious flaws. For example, the wargames conducted at the Naval War College in the early 1920s proved extremely useful in developing promising operational concepts for the use of naval air power, as well as the associated measures of effectiveness. Given the perennial challenge of limited time and resources under which military organizations must operate, well-designed and executed wargames and simulations can provide an invaluable service to those charged with the "futures" mission of concept development and experimentation.

However, experience shows that field exercises, and the experiments they make possible, play a critical role in enabling military organizations to anticipate major shifts in the competition—to anticipate change rather than having to react to it. Over the last century, military field exercises oriented on addressing emerging challenges and opportunities at the operational level of war have proven to be an important enabler of military innovation. Properly undertaken, field exercises are a source of great competitive advantage. Their benefits include:

- Reducing uncertainty concerning how best to meet emerging threats;
- Determining the proper mix of emerging and legacy systems in the future force;
- Enabling militaries to develop and evaluate a wide range of military capabilities and forms of operation, which can be fully and rapidly developed if and when a threat emerges;
- Generating successes that inspire enthusiasm for, and sustain the momentum of, military innovation;
- Complicating the planning of existing and would-be enemies;

- Identifying intra-regime shifts—major shifts in the military competition that, while they do not require large-scale transformation, do require the military to effect significant innovation;
- Helping to avoid premature, large-scale production of emerging systems that may appear promising but that actually offer little in terms of military capability; and
- Identifying and solving the practical problems inherent in developing new operations, force structures and systems that cannot be determined through wargames and simulations alone.

Because of these characteristics, military field exercises are especially beneficial during periods of high uncertainty and rapid change. Such a period exists today. The United States military confronts a highly dynamic international environment. It also must deal with rapid advances in military-related technologies that create great uncertainty with respect to what new military systems, organizations, concepts of operation, and force elements will emerge to supplant the existing military regime, and which will prove to be chimeras. Consequently, the potential for surprise is high during such periods, when the time available to respond to unexpected events is often exceedingly short.[2]

Military field exercises that incorporate experimentation can play an important role in reducing the uncertainty about the future conflict environment and those capabilities, force elements, and operational concepts that will dominate that environment. The ultimate expression of such efforts will likely be the conduct of joint exercises at the operational level of warfare. This is because joint operations (i.e., operations involving two or more of the military services) will almost certainly dominate future military operations, and because the operational level of war is the level at which military campaigns are conducted.

Unfortunately, the Defense Department's rhetoric asserting the need for concept development and experimentation has yet to be matched by any great sense of urgency or any substantial resource support. Those exercises that are undertaken typically focus on improving existing warfighting capabilities rather than on preparing to meet the threats and challenges of tomorrow.

History shows the importance of a vigorous, sustained, and informed approach to experimentation. In January 1929, the United States Navy undertook a major exercise, titled Fleet Problem IX, at a time when battleships were the ultimate expression of sea power. It was one of a series of over 20 major exercises undertaken by the Service during the years between the two world wars. Despite the isolationist mood of America at the time, compounded by tight military budgets and arms control constraints, the Navy persisted in conducting these exercises as, among other things, a means for determining the influence of continuing rapid advances in aviation technology upon sea power.

Fleet Problem IX took place off the coast of Panama. Present for the first time in the fleet problems were two ships of radically different design. These ships, the *Saratoga* and *Lexington*, were aircraft carriers. During the exercise, Vice Admiral William Pratt,

2 For a more detailed discussion of this phenomenon, see Andrew F. Krepinevich, *The Military-Technical Revolution: A Preliminary Assessment* (Unpublished Paper, Office of Net Assessment, Office of the Secretary of Defense, DoD, July 1992); Andrew F. Krepinevich, "Keeping Pace with the Military Technological Revolution," *Issues in Science and Technology* (Summer 1994); and Andrew F. Krepinevich, "Cavalry to Computers: The Pattern of Military Revolutions," *The National Interest* (Fall 1994).

commander-in-chief (CINC) of the U.S. fleet, authorized Rear Admiral Joseph Reeves, commanding the *Saratoga*, to execute a high-speed run toward the Panama Canal. Reeves then "attacked" the canal with a 70-plane strike force launched 140 miles from the target, stunning the wargame's participants.[3]

Following Fleet Problem IX, Admiral Pratt observed, "I believe that when we learn more of the possibilities of the carrier we will come to an acceptance of Admiral Reeves' plan which provides for a very powerful and mobile force . . . the nucleus of which is the carrier."[4] The following year, upon becoming Chief of Naval Operations, Pratt stressed that carriers be placed on the offensive in war games and fleet exercises. Through such exercises, involving experimentation with new kinds of equipment, doctrine and formations, Navy leaders sowed the seeds that brought forth the fast carrier task forces that revolutionized warfare at sea and enabled the U.S. Navy to defeat the Imperial Japanese Navy during World War II.

Eight years after Fleet Problem IX, on the North German Plain in Europe, a new and very different ground formation appeared in exercises conducted by the German Army: the panzer division. The panzer division was a combined arms formation possessing large numbers of fast tanks with substantial range and centered on a doctrine that called for rapid, deep penetration operations as a means for achieving victory. This represented a dramatic departure from Germany's World War I experience against its principal enemy, France. That conflict was dominated by slow-moving forces employing heavy firepower and engaging in a gradual war of attrition.

In the maneuvers, after a 60-mile approach march, the panzer division went on the attack, forcing the "enemy" to commit its reserves. The following day the panzer division not only broke through the enemy front but also penetrated deep into its rear. The enemy's position quickly became untenable, and the contest was essentially decided only four days into what had been planned as a seven-day exercise. General Franz Halder, like many others present who witnessed the spectacle (but who, unlike the others, would also become Chief of the German General Staff a year later), was stunned by the "fluid mobility" of the panzer operations.[5]

Many other field exercises were conducted during the 1920s and 1930s by the German military. They included not only experiments in mechanized warfare but also with various radio communications schemes and with aircraft to provide reconnaissance and close air support for rapidly moving ground forces. These exercises were indispensable in enabling the German high command to develop a devastating new form of land warfare known as *Blitzkrieg*—lightning war.

Again, today's U.S. military finds itself not only at war in Afghanistan and Iraq, but also in a period somewhat similar to the one confronted by the two military organizations

3 Norman Friedman, Thomas C. Hone and Mark D. Mandeles, *The Introduction of Carrier Aviation into the US Navy and Royal Navy: Military-Technical Revolutions, Organizations, and the Problems of Decision* (Unpublished Paper, May 12, 1994), p. 94.

4 Clark G. Reynolds, *The Fast Carriers* (Annapolis, MD: Naval Institute Press, 1968), p. 17. Pratt flew his flag from the *Saratoga* on the return cruise, "partly as a badge of distinction, but most because I want to know what makes the aircraft squadrons tick."

5 Robert M. Citino, *Path to Blitzkrieg* (Boulder, CO: Lynne Rienner Publishers, 1999), p. 241.

cited above. As in the interwar era, rapidly progressing (and diffusing) technologies have emerged, laying the groundwork for disruptive changes in the military competition and the way in which military operations are conducted. But as with naval aviation and mechanized ground operations seventy years ago, it is not yet clear how the future will play out.

Field exercises that incorporate experimentation—at both the Joint and Service level—provide an indispensable means for resolving these questions and, in so doing, determining the proper mix of new and legacy systems required to operate effectively against future threats. Military field exercises at the operational level of warfare confer several critical benefits, both to defense planners and to those concerned with fiscal accountability. These benefits include:

- ***Reducing Uncertainty in Preparing for Emerging Threats.*** Through concept development and experimentation, commanders can develop a feel for those operations that might succeed in such a threat environment and for the force mix and systems requirements needed to support such operations. This proved to be the case with Germany's development of Blitzkrieg. Field exercises enabled the German military to work through the coordination problems associated with fast-moving mechanized formations, other ground formations and supporting air units. Equally important, field exercises also enable military leaders to determine those force elements and modernization plans that will likely diminish in value over time. For example, the Wehrmacht's field exercises in the 1930s helped convince the German Army's leadership that the horse cavalry's glorious epoch was rapidly drawing to a close.

- ***Determining the Proper Mix of Emerging and Legacy Systems.*** A vigorous and rigorous program of concept development and experimentation also assists military organizations in determining those new systems and capabilities that will be required, those existing (or legacy) systems and capabilities that should be sustained, and what kind of mix should be established between the two. The Germans, for instance, used a series of field exercises to experiment with five different mechanized field formations—three of which were eventually adopted. In the case of the panzer division, over the course of these exercises the Germans found their initial design was far too "tank heavy" in proportion to the other elements of the division, such as artillery and engineers. Consequently, the number of tanks in the initial division design was reduced by roughly 50 percent. The proportion of certain supporting forces, such as engineers, was increased. Finally, supporting elements, such as engineers, and legacy systems, such as artillery, were motorized to better enable them to support the tanks' rapid advance.[6] In short, exercises proved critical to the Germans' ability to determine the proper mix of new (e.g., panzer, airborne, radio communications, and reconnaissance and attack aircraft) and existing (e.g., artillery, engineers) capabilities required for mechanized air-land operations.

- ***Reducing Uncertainty by Testing and Evaluating a Wide Range of Capabilities.*** Through concept development and experimentation, military

6 Werner Haupt, *A History of the Panzer Troops, 1916–1945* (West Chester, PA: Schiffer Publishing, 1990), p. 72.

organizations can identify and refine new forms of operations and force elements, which can then be employed relatively quickly if and when a threat emerges. In this way field exercises enable innovation. For example, in the case of innovation, one sees that in the early 1960s the U.S. Army conducted extensive field exercises to assess the potential of airmobile and air-assault operations.[7] These field exercises gave the Army an important option when, in the summer of 1965, it was ordered to deploy large combat forces to Vietnam. The first division selected for deployment was the Army's newly formed 1st Cavalry Division (Airmobile), the end product of a major innovation in land warfare.[8] On a more profound level, the U.S. Navy's series of fleet problems enabled that Service to develop the principles of the fast carrier task force, which supplanted the battleship battle line as the dominant maritime formation for command of the seas. As a consequence of the fleet problems conducted during the 1920s and 1930s, when the battles of Coral Sea and Midway in 1942 clearly revealed the transformation of war at sea, the Navy was able to adapt quickly to conduct fast carrier task force operations.

- ***Generating Successes that Sustain Momentum for Innovation.*** One reason why military transformations typically require a decade or so to bring about is that they must overcome the resistance of large organizations to major change. This is especially true with respect to the U.S. military, which must contend with the additional burden of its remarkable success, but which today is very much absorbed in waging wars in Afghanistan, Iraq and Libya. Thus, the U.S. military and its civilian leaders must be convinced that anticipating and preparing for emerging challenges is necessary and possible. A properly structured and funded concept development and experimentation program, to include involving actual forces in an environment that is as close to actual operations as possible, is arguably unsurpassed in their ability to generate support, and even enthusiasm, for innovation. The Saratoga's raid on the Panama Canal in Fleet Problem IX and the 3rd Panzer Division's performance in the German Army's North German Plain maneuvers convinced many of the officers that witnessed the exercise—in a way that no war game or simulation ever could have that they were onto something special, that a dramatically new and more effective way of conducting military operations was indeed possible.[9]

7 These exercises culminated in the Air Assault I and Air Assault II major field exercises. For a discussion of these exercises, and the related Air Force Goldfire exercises, see Andrew F. Krepinevich, *The Army and Vietnam* (Baltimore, MD: The Johns Hopkins University Press, 1986), pp. 121–27.

8 The Army also considered fielding an Air Cavalry Brigade formation. For a discussion of the rise of airmobile/air assault forces in the US Army, see Krepinevich, *The Army and Vietnam*, pp. 112–27. See also J. Kristopher Keener, *The Helicopter Innovation in United States Army Aviation* (Cambridge, MA: MIT, March 2001).

9 The same tends to be true of transformation in other large, competitive organizations. For example, see John Kotter, "Leading Change: Why Transformation Efforts Fail," *Harvard Business Review*, March-April 1995, pp. 59–67. Kotter emphasizes the importance of creating "short-term wins." He notes that "Most people won't go on in the long march unless they see compelling evidence within 12 to 24 months that the journey is producing expected results." Similarly, field exercises can do much to convince the officer corps that new warfare challenges are real and that there are innovative ways of dealing with them.

- ***Complicating the Planning of Would-Be Enemies.*** Field exercises that enable the U.S. military to buy options on emerging capabilities can also greatly complicate the planning of would-be adversaries. For example, in the 1930s the Imperial Japanese Navy was forced to plan against a U.S. Navy that was exploring a range of options for exploiting the potential of naval aviation, to include the deployment of large (e.g., Saratoga and Lexington) and small (e.g., Ranger) carriers, as well as "mid-sized" carriers (the Yorktown Class); the use of sea planes, airships, and land-based aircraft; as well as proposals for launching a class of flying-deck cruisers. By enabling the creation of a range of capabilities and warfighting options, experimentation can compel would-be adversaries to stretch their limited resources thin, or to take the high-risk option of focusing their efforts on offsetting only one or a few of the new warfighting options. Ideally, when confronted with this dilemma, potential adversaries would find themselves dissuaded from entering into a military competition in the first place.[10]

- ***Identifying Intra-Regime Shifts.*** Save warfare itself field exercises appear to be the best way to maintain an awareness of significant shifts in the character of military competition that sometimes occurs during periods of disruptive change, but which are not themselves disruptive. The U.S. Navy's series of exercises and fleet problems conducted during the period between the world wars identified several such shifts. Tests on the battleship Texas in 1919 showed that aircraft acting as spotters greatly enhanced the battleship's accuracy at extended ranges. Thus, while the carrier had not displaced the battleship, it had nevertheless become indispensable to its effectiveness. Ten years later, Fleet Problem IX showed that carriers could function as a significant strike force in a raid, even though they still had not displaced the battleship as the arbiter of sea control. It was not until the fleet problems of the late 1930s that a substantial number of naval officers became convinced that carrier-based aircraft might be true capital ship killers. In the absence of such fleet exercises, it is doubtful the Navy would have either identified these shifts in the military competition, or adapted to them as quickly and as well as it did.

10 Again, the highly competitive corporate sector offers instructive insight. The ability and the will to produce a range of capabilities can greatly complicate an adversary's ability to compete. A classic example is the war waged between Honda and Yamaha for supremacy in the motorcycle market, known in Japanese business circles as the "H-Y War." Yamaha was the "aggressor," in that it built a factory that would enable it to become the world's largest motorcycle manufacturer. The key to Honda defeating this challenge was its ability to rapidly increase the rate and range of change in its product line, which it used to bury Yamaha. At the war's start, both firms had roughly 60 models of motorcycles. Over the next 18 months, Honda introduced or replaced 113 models, turning over its product line twice, while Yamaha could manage only 37 changes during that same time period. This parallels in rough fashion the US Navy's development of a wide range of naval aviation "products" during the interwar years, and its ability to move rapidly to place them into the wartime "markets" (i.e., mission areas) where they were required. See George Stalk, Jr., "Time—The Next Source of Competitive Advantage," *Harvard Business Review*, July-August 1988, pp. 44–45.

Similarly, were the U.S. military to conduct field exercises today to address thegrowing anti-access/area-denial (A2/AD) threats[11] from China and Iran, they might reveal important

11 As the Cold War drew to a close, the Pentagon's Office of Net Assessment began exploring how conflicts might change now that the Soviet Union no longer posed a threat to the United States and given precision-guided warfare's demonstrated effectiveness in the First Gulf War. In the early 1990s I drafted a series of three assessments examining the issue of whether a military revolution, or dramatic shift, in the character of military competitions was underway. The assessments described what has become known as the anti-access/area-denial challenge. The final assessment, completed in November 1993, noted the following:

> As peer competitors [i.e., states with military potential comparable to that of the United States] become increasingly proficient in exploiting advanced technologies . . . and as many Third World states acquire more destructive, extended-range weaponry, the conduct of forcible-entry operations will change dramatically. For peer competitor states operating against aggressor non-peer competitor states [i.e., states in the developing world], the threat environment could require that forcible entry operations be initiated at extended ranges (although they may be supported by infiltrated forces, like special operations forces) and by coalition partners or allies whose geographic location may place them, de facto, at close range with the aggressor. For peer competitors, the ever-increasing engagement envelopes of non-competitor states will likely alter dramatically traditional notions regarding the benefits of forward-deployed forces . . . .
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> Forward bases—those huge, sprawling complexes that bring to mind such places as Malta, Singapore, Subic Bay, Clark Air Base, and Dhahran—will become great liabilities, not precious assets. The reason is simple: [as] Third World states acquire significant numbers of ranged-fire systems (i.e., ballistic and cruise missiles, high performance aircraft) and enormously more effective munitions (i.e., smart bombs; nuclear, chemical, and biological weapons), these bases' "sudden" vulnerability will deter their owners from acting to deter or thwart aggression. Their occupants will find themselves in the uncomfortable (and certainly unintended) role of hostages to the growing military capabilities of Third World nations. Rather than acting as a source of assurance to friends and allies in the region, these bases will be a source of anxiety . . . . Rather than a source of stability in a crisis, the bases will likely encourage one side or both toward pre-emptive strikes: either against the base before its assets can be dispersed or against the potential aggressor in an attempt to disarm it of its ranged-fire strike capability.
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> Forward-deployed naval forces may be able to offset the future liabilities of forward bases, but only partially and probably not for very long, as currently configured. The traditional carrier task force or surface action group possesses neither the mobility nor the stealth to function as the spear tip of forcible entry operations.

Starting in the mid-1990s, senior US military leaders began voicing similar concerns over the US military's ability to deal with such contingencies. General Ronald Fogleman, then Air Force chief of staff, observed in 1996 that

> Saturation ballistic missile attacks against littoral forces, ports, airfields, storage facilities, and staging areas could make it extremely costly to project US forces into a disputed theater, much less carry out operations to defeat a well-armed aggressor. Simply the threat of such enemy missile attacks might deter US and coalition partners from responding to aggression in the first instance.

Admiral Jay Johnson, then chief of naval operations, expressed very similar concerns when he declared

> Over the past ten years, it has become evident that proliferating weapon and information technologies will enable our foes to attack the ports and airfields needed for the forward deployment of our land-based forces.

Perhaps most revealing, however, are the comments of a retired Indian brigadier general, who observed immediately following the First Gulf War that future access to forward bases

> is, by far the trickiest part of the American operational problem. This is the proverbial "Achilles heel." India needs to study the vulnerabilities and create covert bodies to develop plans and execute operations to degrade these facilities in the run up to and after commencement of hostilities. Scope exists for low cost options to significantly reduce the combat potential of forces operating from these facilities.

If, as General Fogleman and Admiral Johnson observed, anti-access (A2) strategies aim to prevent US forces from operating from fixed land bases in a theater of operations, then area-denial (AD) operations aim to prevent the freedom of action of maritime forces operating in the theater. Admiral Johnson expressed these concerns when he declared

> I anticipate that the next century will see . . . [our] foes striving to target concentrations of troops and materiel ashore and attack our forces at sea and in the air. This is more than a sea-denial threat or a Navy problem. It is an area-denial threat whose defeat or negation will become the single most crucial element in projecting and sustaining US military power where it is needed.

The concerns of military leaders were echoed by the National Defense Panel (NDP), formed by Congress in 1997 to review long-term US strategy. The NDP concluded that the threat to forward base access was real, and would almost certainly grow over time. The NDP therefore concluded that the United States "must radically alter" the way in which its military projects power.

Anti-access/area-denial operations can include coordinated operations by an enemy's air forces and integrated air defenses to maintain a degree of air parity or superiority over its territory and forces. Land-based A2/AD operations might include short- to medium-range artillery, rocket, or missiles strikes against US forward-based forces and forward-deploying forces (which can include forcible entry forces) at either their littoral penetration points or at air-landing points. These enemy forces can also be employed against friendly maritime forces, and may also include antiship cruise, or even ballistic, missiles and submarines armed with torpedoes or antiship cruise missiles (ASCMs). Closer to shore, sophisticated mines, coastal submarines, and small attack craft could be employed against US forces.

intra-regime shifts. For example, they may reveal that it is becoming prohibitively costly to deploy, sustain and operate U.S. forces from large, fixed forward bases, such as major ports and advanced air bases. It may also be possible, however, for the U.S. military to adapt itself so that it could still project decisive force in the absence of such base access. Either way it would be very useful to know whether there exist points of innovation that enable a significant—if not disruptive—shift in the military competition.

For instance, depending upon the relative success enjoyed by those militaries seeking to develop A2/AD capabilities and those seeking to defeat them, one side or the other might gain an advantage for a limited period of time. If A2/AD capabilities gain the upper hand, this would be important to know, lest U.S. forces find themselves confronted with latter-day versions of Omaha Beach, Anzio and Tarawa as they attempt to deploy and sustain themselves through major forward bases. If, on the other hand, U.S. concept development and experimentation initiatives enable power-projection forces to gain a clear (albeit evanescent) advantage, it would be important to know, both for deterrence and warfighting purposes. For instance, at some point in its transformation the U.S. military might have created, in essence, a spearhead force capable of swiftly defeating a nascent anti-access threat, thereby enabling the prompt, effective use of follow-on legacy forces in more traditional operations.12 Obviously, the matter of whether such a capability does, in fact, reside within the U.S. military would be of critical importance. As the U.S. Navy's fleet problems indicate, properly designed and executed concept development, gaming and field exercises offer perhaps the best opportunity to identify and monitor whether the U.S. military possesses such a "spearhead capability" and to determine when intra-regime shifts are occurring.

- ***Avoiding the Premature Large-Scale Production of New Military Systems***
  - ***Avoiding "False Starts."*** Field exercises, especially those that incorporate experiments, can help military organizations avoid buying large quantities of a promising system too early during a period of transformational change in military capabilities. The U.S. Navy's first carrier designed from the keel up, the Ranger, was commissioned in 1934. Although some Navy leaders had pressed for construction of five Ranger-Class carriers, war game analysis and fleet problems soon indicated that, at roughly 14,000 tons, the Ranger was far too small to meet many of the demands of future fleet operations. As it turned out, the Essex-Class carriers that formed the backbone of the Navy's fast carrier task forces in World War II each displaced nearly twice as much tonnage as the Ranger.

  - ***Avoiding "Dead Ends."*** Military systems or capabilities that appear promising, or even revolutionary, sometimes fail to live up to expectations. In this case, the challenge of those leading the effort is not to avoid buying them too early; rather, it is to avoid buying them at all. The experience of the U.S.

12 In fact, the US military's possession of such a capability appears to be a key assumption of the Air Force's Global Strike Task Force, the Navy's Assured Access, and the Army's Objective Force warfighting concepts.

Navy during the development of naval aviation in the interwar period again provides an example of how rigorous experimentation and field exercises can help avoid dead ends. In 1930 the Navy's Bureau of Aeronautics proposed the construction of eight 10,000-ton flying-deck (or flight-deck) cruisers. The ships—half cruiser and half flight deck—were subjected to war game analysis at the Naval War College and some experiments employing surrogates in the fleet. Both painted a distinctly unfavorable picture of the hybrid ship, and it quickly sank beneath the Navy's programmatic waves.

- ***Identifying and Solving Practical Problems.*** Although important in their own right, planning exercises, simulations and war games can only go so far in identifying new forms of operation and new military system requirements.[13] Indeed, even the best war games have serious limitations. War games can be very helpful in providing useful insights; however, they do not offer the detailed level of resolution obtained from well-designed and executed field exercises. This drawback is critical for in war, as with many other things, the devil is often in the details. For example, war games conducted at the Naval War College in the early 1920s indicated the importance of maximizing carrier aircraft complements and aircraft sortie rates.[14] It was not, however, until a prototype carrier (the Langley) was launched that the Navy could determine precisely how this goal was to be achieved (or, indeed, whether it could be achieved at all). Under Captain Joseph Reeves, the Langley conducted a series of exercises and experiments that led to such innovations as crash barriers and the deck park, which enabled the ship to more than double its aircraft complement and dramatically increase its sortie rate.[15] Similarly, the German Army's field exercises and operations in the late 1930s enabled it to solve critical issues with respect to fuel and spare parts requirements for its panzer formations, and the means by which the German Air Force, the Luftwaffe, would function as a highly mobile source of reconnaissance and fire (close air) support. Field exercises like these were essential to both militaries' efforts to transform and dominate the emerging conflict environment.

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If history is any guide, and if the Defense Department is serious about transforming the U.S. military, then ***concept development and experimentation oriented on that goal must be initiated now and conducted on a frequent basis***. Moreover,

13 As noted earlier, planning exercises, simulations and war games are important analytic tools that can greatly enhance the effectiveness of field exercises by identifying those promising capabilities that merit prototyping, those new force elements that should be established, and operational concepts that merit the detailed evaluation that only field exercises can provide. Thus these analytic devices serve as a filter to enhance the focus and value of field exercises. This is critical as field exercises are far more costly to undertake (and thus are conducted far less frequently) than war games, simulations or planning exercises.

14 A sortie is one mission flown by one aircraft.

15 Norman Friedman, "The Aircraft Carrier," in *The Eclipse of the Big Gun: The Warship, 1906–1945*, ed. Robert Gardiner (Annapolis, MD: Naval Institute Press, 1992), p. 39; and Reynolds, *Admiral John H. Towers*, p. 205.

funding, forces and equipment (to include rapidly prototyped equipment and surrogates) must be made available to support these exercises.

Recall that during the interwar period of the 1920s and 1930s, the U.S. Navy conducted twenty-one fleet problems involving large elements of the fleet. Some fleet problems were so extensive that they comprised several major phases, each of which could have been viewed as an independent exercise. The German Army continually found ways to conduct substantial field exercises even during Germany's period of disarmament from 1919–35. Following the onset of rearmament, the German military moved quickly to conduct the largest field exercises of the interwar period, while concurrently conducting major operations in the Spanish Civil War.

Both of these militaries were animated by a sense of urgency among their military leaders that rapid (and perhaps profound) changes in the threat environment or character of the conflict were possible, if not imminent. The U.S. Navy was acutely aware of the growing challenge posed by the Imperial Japanese Navy, both in terms of its growing strength and its efforts to exploit the potential of naval aviation. The German Army was driven by the need to avoid a protracted war of attrition on multiple fronts, the type that led to its defeat in World War I. This led to the *Wehrmacht's* vigorous efforts to exploit rapidly advancing technologies (i.e., automotive, aviation, radio) to restore mobility to the battlefield. The urgent need to keep pace with the competition, to determine as best as possible the direction warfare was headed, and to reduce uncertainty about what new (and legacy) capabilities would prove effective (and which would not), led these innovative militaries to exploit the potential of field/fleet exercises with a keen sense of urgency.

Today the character of conflict is shifting once again, and the U.S. military must innovate and adapt to maintain its competitive position. Unfortunately, Joint Forces Command—whose creation was stimulated through Congressional pressure—has never, despite the efforts of many dedicated individuals, fulfilled its mission of anticipating and preparing the U.S. military to meet emerging challenges.

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While field exercises designed to identify and exploit promising paths toward military transformation must be vigorous, sustained and comprehensive, history also indicates that their principal focus should be oriented on ***meeting challenges (or exploiting opportunities) at the operational level of warfare.*** Moreover, such field exercises must be directed at preparing forces for the challenges of the next war, not at becoming more proficient at waging the last one. Concepts of operation for dealing with emerging threats can be viewed as the point in transformation where the rubber meets the road. Such new concepts, particularly in their early forms, represent educated judgments about what new mix of force elements and capabilities will be required to operate effectively in the new competitive environment. As such, they constitute a very significant initial effort to identify the winners and losers that will emerge out of military transformation.

As noted above, failing to take these factors into consideration runs the risk that field exercises will arrive at some very good solutions to the wrong problems. This, regrettably, is all too often the case with current field exercises. To be sure, some progress has been

made. For example, there is growing acceptance within the U.S. military of the anti-access and area-denial threats to U.S. power-projection capabilities. But progress has been fitful at best. For example, the Air Force and Navy are still struggling to develop an AirSea Battle concept to address the A2/AD challenge well over a decade after their Service chiefs identified the challenge.

There is a possible explanation for why we have, thus far, seen so little in the way of specifics when it comes to concepts of operation. First, presenting detailed operational concepts for dealing with the anti-access/area-denial threat and other challenges would inevitably lead to a significantly different force structure and systems requirement mix—i.e., significant changes in the Services' current program of record. By identifying "losers" within its own projected force, a Service runs the risk of having these programs attacked by other Services competing for limited resources. It also may encounter opposition from its own subcultures that stand to see their relative stature within the Service decline.

The absence of specificity and alternatives with respect to current Service concepts of operation is reflected in the absence of a healthy competition among the Services to determining the new force structure, system and program changes required to adapt the U.S. military to address emerging challenges. This is regrettable, as inter-Service competition along these lines could provide a strong impetus for generating the innovation required to enable transformation.

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JFCOM's "futures" mission remains too critical to ignore. Among the worrisome developments demanding our attention:

- China is fielding what the Pentagon terms anti-access/area-denial forces, including growing numbers of ballistic missiles and submarines designed to deny the United States the ability to protect its allies and interests in the Western Pacific. How should our military best preserve a stable military balance under these circumstances?

- We are witnessing the gradual diffusion of guided rockets, artillery, mortars and missiles (known as "G-RAMM") to irregular forces. For example, in 2006, Hezbollah's use of these weapons prompted the evacuation of over 100,000 Israelis from their homes and the shutdown of Israel's oil distribution system. How should the U.S. military prepare for G-RAMM as the "next big thing" in irregular warfare?

- Defending maritime commerce against G-RAMM-armed adversaries promises to be a highly challenging proposition. This applies not only to commercial shipping, but also the trillions of dollars in economic infrastructure on the U.S. continental shelf, including offshore oil and gas rigs and wells and fiber optic cables. In a world in which South American drug cartels now ship their illegal cargo via unmanned underwater vehicles, the ability to inflict major damage on the U.S. economy is increasingly within the reach of non-state groups. How should our military respond to this growing threat?

- Our military is critically dependent upon satellites for everything from communications to target identification to payload delivery. China has demonstrated a growing ability to disable or destroy these satellites, and other countries may follow suit. How should the U.S. military adapt its space architecture? What alternatives might allow the United States to reduce its reliance on satellites for precision navigation, intelligence-gathering and long-distance communication?

These are exactly the kinds of challenges and the important questions that JFCOM was created to address.

Regardless of the ultimate fate of JFCOM, there remains an urgent need to develop innovative military operations with an eye toward creating the forces and capabilities needed to present an effective counter response. Simultaneously, we also need to identify lower priority military systems that can be responsibly curtailed or eliminated in an era of declining defense budgets.

Done well, this effort could enable our military to get out in front of emerging challenges, and discourage potential rivals from pursuing aggressive actions against the United States, our friends and allies, and our global interests.

JFCOM's overarching mission must have a home somewhere. Equally important, JFCOM's futures mission deserves the strongest possible support from senior Defense Department policymakers and military leaders. Although JFCOM is being disbanded, its core missions must be sustained. As noted above, the "joint force trainer" and "joint force provider" missions have occupied much of the command's attention and appear to have found "homes." The orphan mission—joint concept development and experimentation—has always been at the margins, despite being the inspiration for the command's creation. Unless steps are taken to ensure it is finally given the priority it deserves, I suspect we are in for a future in which we find ourselves reacting to our enemies' stratagems rather than anticipating them.

The potential gains from a properly directed and funded field exercise campaign are clear. One only has to look at how blitzkrieg upset the military balance in Europe and how the U.S. Navy's fast carrier task forces turned the tide in the Pacific during World War II to see the payoff of successful military transformation. By extension, the importance of a well-designed program of concept development, war gaming, simulations and field exercises that incorporate high-fidelity experimentation is also shown. The cost of such an initiative would run under one percent of the U.S. defense budget. The risks associated with downplaying the need to anticipate disruptive changes in the military competition are also clear. They include investing in false starts and dead ends, arriving at the "right" solutions to the wrong threats, and, ultimately, the prospect of paying a price measured in jeopardized security interests, national treasure, and the lives of young American service men and women.

Thank you, Mr. Chairman and Members of the Committee

## About the Center for Strategic and Budgetary Assessments

The Center for Strategic and Budgetary Assessments (CSBA) is an independent, nonpartisan policy research institute established to promote innovative thinking and debate about national security strategy and investment options. CSBA's goal is to enable policymakers to make informed decisions on matters of strategy, security policy and resource allocation.

CSBA provides timely, impartial and insightful analyses to senior decision makers in the executive and legislative branches, as well as to the media and the broader national security community. CSBA encourages thoughtful participation in the development of national security strategy and policy, and in the allocation of scarce human and capital resources. CSBA's analysis and outreach focus on key questions related to existing and emerging threats to US national security. Meeting these challenges will require transforming the national security establishment, and we are devoted to helping achieve this end.

**DISCLOSURE FORM FOR WITNESSES**
**CONCERNING FEDERAL CONTRACT AND GRANT INFORMATION**

**Witness name:** Dr. Andrew Krepinevich

**Capacity in which appearing:** Representative

**If appearing in a representative capacity, name of the company, association or other entity being represented:** Center for Strategic and Budgetary Assessments

**FISCAL YEAR 2011**

| federal grant(s) / contracts | federal agency | dollar value | subject(s) of contract or grant |
|---|---|---|---|
| DoD/ONA | DoD | 1,360,000 | Assessment/analysis, wargames and briefings on strategic challenges and future warfare |
| DLA Acquisition Directorate | National Defense University | $75,000 | Secretary of Defense Corporate Fellows Program Orientation |

**FISCAL YEAR 2010**

| federal grant(s) / contracts | federal agency | dollar value | subject(s) of contract or grant |
|---|---|---|---|
| DoD/ONA | DoD | $3,000,000 | Assessments/analysis, wargames, and briefings on international security environment, strategic challenges, future warfare, and portfolio rebalancing |
| DLA Acquisition Directorate | National Defense University | $75,000 | Secretary of Defense Corporate Fellows Program Orientation |
| Department of the Interior | DARPA | $815,000 | Real Time Sensor Simulation: IR Sensor Modeling in Real Time Simulations Study |

**FISCAL YEAR 2009**

| Federal grant(s) / contracts | federal agency | dollar value | subject(s) of contract or grant |
|---|---|---|---|
| US Marine Corps | DoD | $65,000 | External review of Vision and Strategy and other strategy documents |
| US Air Force | DoD | $250,000 | Red Teaming, Analytical and Facilitation support to AF/A8X Strategic Planning |

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|---|---|---|---|
| DoD/ONA | DoD | $3,000,000 | Assessments/analysis, wargames, and briefings on international security environment, strategic challenges, future warfare, and portfolio rebalancing |
| OSD/OFT | DoD | $245,000 | Transformation Roadmap Irregular Warfare |

**Federal Contract Information:**

Number of contracts (including subcontracts) with the federal government:

Current fiscal year (2011):_2_____;
Fiscal year 2010:___3_____;
Fiscal year 2009:___6_____.

Federal agencies with which federal contracts are held:

Current fiscal year (2011):__2_____;
Fiscal year 2010:_____3_____;
Fiscal year 2009:_____1_____.

List of subjects of federal contract(s) (for example, ship construction, aircraft parts manufacturing, software design, force structure consultant, architecture & engineering services, etc.):

Current fiscal year (2011):___Research and Analysis Services____;
Fiscal year 2010:___Research and Analysis Services_____;
Fiscal year 2009:___Research and Analysis Services_____.

Aggregate dollar value of federal contracts held:

Current fiscal year (2011):__$1,435,000____;
Fiscal year 2010:_____$3,900,000___;
Fiscal year 2009:_____$4,900,000___.

**Federal Grant Information:** If you or the entity you represent before the Committee on Armed Services has grants (including subgrants) with the federal government, please provide the following information:

Number of grants (including subgrants) with the federal government: NO GRANTS 2009-2011

Federal agencies with which federal grants are held: NO GRANTS 2009-2011