Defense Transformation

TESTIMONY

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Mr. Chairman and members of the committee, it is a great honor to appear before you today to discuss the issue of military transformation.

Today we face a challenge that is arguably unprecedented in the nation's history: transforming our armed forces into a very different kind of military, while at the same time sustaining its ability to play a very active role in supporting US near-term efforts to defeat terrorism and preserve global stability.

WHAT IS TRANSFORMATION?

Transformation can be thought of as innovation on a grand scale. Transformation is undertaken by a military that believes major changes are occurring in the character of conflict. Periods of military transformation are typically associated with a revolution in military affairs, or an RMA, in which a combination of technology, warfighting concepts and organizational change combine to bring about a dramatic leap in military effectiveness.

Militaries are motivated to transform most often because they conclude either that very different operational challenges are arising that will greatly reduce the effectiveness of existing forces, or because they see an opportunity to develop new forms of operations themselves that will yield great advantage in future military competitions.

As important as it is to understand what transformation is, it is just as important to understand what transformation is not.

- Transformation is not a "monopoly" of the United States military. The rise of anti-access/area-denial threats and nontraditional forms of attack on our homeland, as well as the prospect of counter-space operations and electronic strike, are examples of emerging challenges to our military that did not exist until relatively recently. In short, in the face of US military superiority, our existing and prospective adversaries are adapting to present us with different kinds of threats.

- Transformation is not solely based on introducing new technologies into the force. It also requires changes in the way the force is employed through major changes in doctrine and force structure.

- Transformation is not about enhancing our efficiency in existing warfighting operational concepts; rather, it is about developing new warfighting concepts.

- Transformation does not mean supplanting the entire force with new systems and force structures. Today our challenge is to identify what mix of existing and emerging systems and capabilities is required to deal with the new threat environment envisioned in our defense strategy, while also exploiting our sources of greatest potential advantage.

WHY TRANSFORM THE WORLD'S BEST MILITARY?

The Bush Administration, in its Quadrennial Defense Review, (QDR), has articulated a persuasive case on the need to transform the US military. The heart of its argument is that the challenges and opportunities that confront the US military are quite different from those they

encountered during the Cold War and Desert Storm, or even during the 1990s, and that greater change is clearly on the horizon. Consequently, merely improving upon today's capabilities will not suffice to meet tomorrow's challenges. Moreover, the administration argues that US military also has the opportunity to make dramatic qualitative improvements in its capabilities, regardless of the threat's character. Finally, since the character of the threat is changing, improvements in US military capabilities must be linked to addressing these changes.

The argument that the US military needs to move beyond Cold War/Desert Storm era forms of conflict—and the two-major theater war posture they spawned—to address new challenges to America's security (and to exploit opportunities to improve its capabilities) is outlined in the QDR's "critical operational goals," which can be summarized as:

- Protecting critical bases of operation, at home and abroad, and defeating CBRNE [chemical, biological, radiological, nuclear, and high-explosive] weapons and their delivery systems;

- Prevailing in information warfare, both in offensive and defensive operations;

- Projecting and sustaining US forces in an anti-access/area-denial environment (A2/AD), and defeating A2/AD threats;

- Denying enemies sanctuary from US attack;

- Preserving the US ability to operate effectively in space; and

- Leveraging information technologies and innovative operational concepts to develop an interoperable, joint C4ISR architecture.

What follows is a summary of what are, arguably, the two most formidable emerging challenges to confront our military—homeland defense and anti-access/area-denial.

HOMELAND DEFENSE
An enduring source of competitive advantage for the United States has been its geographic insularity. This has often enabled the United States to devote the vast majority of its defense resources to maintaining forces overseas in forward deployed positions, or to organizing CONUS-based forces for expeditionary operations. However, in recent years the global transportation network has made long-distance travel increasingly routine. This, combined with the rapidly growing access of small groups and even individuals to ever greater destructive power has eroded the value of America's geographic remoteness and placed the US homeland at much greater risk of significant attack, either from hostile nonstate actors, or from states employing nontraditional means of attack.

To be sure, the United States was, for much of the Cold War, under the threat of a catastrophic attack from the nuclear forces of the Soviet Union. However, a combination of faith in the US nuclear deterrent and realization that effective defense against large-scale nuclear attack was not feasible led to a relatively modest effort on active (e.g., ballistic missile defense) and passive

(e.g., civil defense) defenses. America now finds itself at risk of attack from a range of enemies, both state and nonstate, as well as from an array of new threats, to include the covert introduction of weapons of mass destruction (WMD) and attacks on the national information infrastructure. Moreover, the events of 9-11 indicate that at least some of these enemies cannot be deterred through traditional means. The result is that now America must divert substantial resources to the defense of the homeland. While in some respects this mission is as old as the American Revolution itself, it is certainly new in both its form and intensity. A national strategy for defending the homeland has yet to be devised. Thus it is difficult to ascertain the role the US military will be asked to play, or to assess the Defense Department's budget and program priorities with respect to Homeland Defense.

ANTI-ACCESS AND AREA DENIAL

Despite all the uncertainties the US military must confront in preparing for the future, two things seem certain. First, given the United States current military dominance, the incentive is high for would-be adversaries to present the American military with very different challenges. Second, the diffusion of military technologies and the rapid progression of military-related technologies will increasingly offer such adversaries the means to achieve this goal.

This possibility is particularly true with respect to the traditional form of US power-projection operations. The United States' ability to maintain stability in key regions around the globe rests on its capacity to project power, rapidly and decisively, where it is needed. However, the US military's traditional method of deploying and sustaining air and ground forces at or through major ports and airfields is almost certain to be put at risk as a consequence of major shifts in the geopolitical and military-technical environment.

Unlike during the Cold War, it cannot be assumed that allies will provide base access whenever it is needed. Instead *ad hoc* coalitions, or "coalitions of the willing," must be cobbled together depending on the situation. For example, during Operation Desert Fox in 1998, both Saudi Arabia and Turkey refused to allow US air strikes on Iraq to originate from bases on their soil. Similarly, in 1999, Greece, America's long-term North Atlantic Treaty Organization (NATO) ally, refused to permit US forces to operate from its bases during Operation Allied Force. Most recently, the United States has found unfettered forward base access difficult to come by in the war against al Qaeda terrorist forces and the Taliban regime in Afghanistan. States in the region have, for the most part, either denied the US military access to bases, or placed severe restrictions on their use, especially in the case of strike operations.

Nor can the US military be confident that adequate basing facilities will be available in any event. During the Cold War, the United States developed modern base facilities to optimize the military's ability to execute the strategy of containment of the Soviet Union. Correspondingly, the US military developed forces that became dependent on these well-developed facilities in Western Europe and Northeast Asia. But the Cold War is over, and the US military has confronted the harsh reality that basing facilities in many other parts of the world—in places such as Somalia, Rwanda, Albania and Afghanistan—are austere in the extreme compared to their Cold War era counterparts. Indeed, the Army's current transformation efforts seem driven, to a significant degree, by its recent inability to deploy forces rapidly to the Albania-Kosovo border during the Balkan conflict. Making matters worse, potential flash points, such as the

Asian Subcontinent, Spratly Islands and Taiwan Straits, lie in regions that seem geographically bereft of even modest local basing facilities to accommodate the US military's short-range fighter aircraft and medium/heavy ground forces.

Even more disconcerting is the growing proliferation of national and commercial satellite services and missile technology. Increased access to these satellite services will allow even regional rogue states both to pre-target key fixed facilities and to monitor US deployments into forward bases. Unless one makes heroic assumptions regarding advances in missile defense effectiveness, these facilities can be held at risk through the employment of large numbers of ballistic and cruise missiles. Senior US military leaders have already voiced strong concern over the ability to deal with such a contingency. General Ronald Fogleman, when Air Force chief of staff, observed 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.[1]

Admiral Jay Johnson, when 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.
>
> I anticipate that the next century will see those 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.[2]

Perhaps most revealing, however, are the comments of a retired Indian brigadier general, who observed 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.[3]

As Admiral Johnson observed, US maritime forces will also confront new challenges to their ability to project power. The Navy will increasingly find itself operating in the littoral, for two

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[1] Bill Gertz, "The Air Force and Missile Defense," *Air Force Magazine,* February 1996, p. 72.

[2] Admiral Jay Johnson, "Anytime, Anywhere: A Navy for the 21st Century," *Proceedings,* November 1997, p. 49.

[3] Brigadier V. K. Nair, *War in the Gulf: Lessons for the Third World* (New Delhi, India: Lancer International, 1992), p. 230.

reasons. First, there are no navies that can challenge the US fleet on the high seas. Second, with forward bases coming under increased risk of destruction from ballistic and cruise missile attack, the fleet will have to move closer to shore to support efforts to defeat anti-access forces and project power against other enemy forces ashore.

As this happens, the fleet will increasingly encounter so-called area-denial forces in the form of sophisticated anti-ship mines, coastal submarine flotillas, onshore high-speed anti-ship cruise missiles and other enemy capabilities that may place the US carrier-centric fleet at significantly greater risk. In short, as the fleet moves from Cold War era blue-water sea control to focus increasingly on green-water littoral sea control, it will come within range of more and more of the enemy's military capabilities. Making matters worse, the screening elements that protect the carrier, the Navy's core strike element, will begin to collapse back on the carrier as they encounter the coastline.[4] Thus, not only will maritime forces come within range of more enemy systems, their warning time of attack will be reduced as well. The diffusion of weapon systems, such as high-speed antiship cruise missiles, will reduce warning time even further. [5]

These concerns have not been lost on the Defense Department leadership. As Secretary of Defense Rumsfeld noted, "[P]otential adversaries . . . . see that our ability to project force into the distant corners of the world where they live depends, in some cases, on vulnerable foreign bases."[6] Deputy Secretary of Defense Paul Wolfowitz, in expanding on Secretary Rumsfeld's observation, stated that

> US forces depend on vulnerable foreign bases to operate—creating incentives for adversaries to develop 'access denial' capabilities to keep us out of their neighborhoods. We must, therefore, reduce our dependence on predictable and vulnerable base structure, by exploiting a number of technologies that include longer-range aircraft, unmanned aerial vehicles, and stealthy platforms, as well as reducing the amount of logistical support needed by our ground forces.[7]

Their concerns are reflected in the QDR's critical operational challenges, and also in the document's elaboration on the kinds of capabilities required to defeat the challenge:

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[4] The anti-air warfare (AAW) and anti-submarine warfare (ASW) ships that protect the carrier obviously cannot operate on land. As the carrier maneuvers closer to shore in order to strike targets inland, the protective "bubble" provided by these ships will begin to collapse as they encounter the shoreline. It is important to note that these escorts typically operate at great distances from the carrier when in a warfighting environment. For the sake of example, if a carrier were positioned in Washington, DC, antiair escorts (such as Aegis cruisers and destroyers) would be positioned as far away as Harrisonburg, Pennsylvania, Trenton, New Jersey, and Norfolk, Virginia. This example is taken from Admiral James D. Watkins, *The Maritime Strategy* (Annapolis, MD: US Naval Institute Press, January 1986), p. 13.

[5] For a discussion of the area-denial threat, see VADM Arthur K. Cebrowski and Captain Wayne P. Hughes (USN, Ret.), "Rebalancing the Fleet," *Proceedings,* November 1999; and Captain Wayne P. Hughes (USN, Ret.), *Fleet Tactics and Coastal Combat* (Annapolis, MD: Naval Institute Press, 2000), pp. 145–68.

[6] Speech, Secretary of Defense Donald Rumsfeld, The National Defense University, Washington, DC, January 31, 2002.

[7] Testimony, Paul D. Wolfowitz, House Budget Committee, Washington, DC, February 12, 2002.

> These joint forces . . . must be lighter, more lethal and maneuverable, survivable, and more readily deployed and employed in and integrated fashion. They must be not only capable of conducting distributed and dispersed operations, but also able to force entry in anti-access or area-denial environments.[8]

> US forces . . . must have the ability to arrive quickly at non-traditional points of debarkation to mass fire against an alerted enemy and to mask their own movements to deceive the enemy and by pass its defenses.[9]

Thus would-be adversaries have strong incentives to adopt this indirect approach to defeating, or deterring, US power-projection operations. The effort, as noted above, seems well under way. According to a recent Defense Science Board (DSB) study, a regional power's development of this kind of anti-access capability by 2010 is quite plausible, even given relatively severe resource constraints.[10] A former commander-in-chief of US forces in Korea declared that the problem of forward base access is not a problem for the US military of 2010, but one has existed in embryonic form in Korea for much of the 1990s, and which will only worsen over time.

Defeating the A2/AD threat promises to be a very challenging proposition. States developing A2/AD forces are doing so in such as way as to make them more difficult to target. To this end they are emphasizing, or are likely to emphasize:

- Mobility and dispersion (e.g., mobile launchers for ballistic and cruise missiles);

- Stealth (e.g., diesel submarines; low-observable cruise missiles; mines);

- Hardening of fixed targets (e.g., WMD production and storage facilities; command centers; leadership facilities);

- Deception (e.g., coastal combatants masquerading as commercial vessels; terrorists posing as noncombatants);

- "Hostages" (e.g., positioning military forces in noncombatant neighborhoods);

- Geography (e.g., deploying forces far inland to stress US forces' range and targeting capabilities); and

- Sanctuaries (e.g., neutral party space assets; the threat of WMD attacks to create a national sanctuary; positioning military forces in very close proximity to cultural landmarks, hospitals, and related structures to create a local sanctuary effect).

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[8] Department of Defense, *Report of the Quadrennial Defense Review* (Washington, DC: DoD, September 2001), p. 32.

[9] Ibid., p. 43.

[10] DSB, *Final Report of the Defense Science Board Task Force on Globalization and Security* (Washington, DC: Office of the Under Secretary of Defense for Acquisition and Technology, December 1999), p. vi.

To the extent they must operate outside of the enemy's A2/AD envelope, US forces will find their reconnaissance, surveillance, target acquisition (RSTA) timelines stretched, making destruction of enemy critical mobile A2/AD targets an even more difficult proposition. Indeed, a critical sub-competition of the A2/AD challenge involves enemy efforts to stretch US RSTA and engagement timelines versus US military attempts to compress its engagement cycle timelines. In response, it appears we will have to place substantially greater emphasis on long-range/long-dwell reconnaissance and strike capabilities.

Of course, such timelines can be compressed, and the opportunities for defeating the A2/AD threat enhanced, by US forces operating underneath the enemy's A2/AD umbrella. This will likely require forces that can insert themselves in a distributed manner, and which can both operate and sustain themselves in highly distributed, highly networked manner. It also favors forces that further minimize their risk of detection through various forms of stealth—to include signature reduction; and cover, concealment and deception—as well as mobility.

In short, enemy asymmetric strategies—such as threatening nontraditional attacks on the American homeland and anti-access/area-denial—are designed to offset the US military's dominance in traditional forms of warfare. They also represent *cost-imposing strategies* in that the US military in general will likely incur substantially greater costs to offset these asymmetric strategies than America's enemies will incur to generate them.

NEEDED: A TRANSFORMATION STRATEGY

Transformation is *not* synonymous with a revolution in military affairs. Rather, transformation is a *process* that a defense establishment undertakes if it believes a military revolution is under way, or is potentially under way. The Defense Department therefore needs a strategy for transformation. It is not a warfighting strategy (although it would include a vision of what the transformed conflict environment would be like). Rather, it is a strategy for large-scale innovation, to include such major elements as changes in the personnel management system, in the selection of senior leaders, in procurement strategy, and in training—especially field exercises conducted at the operational level of warfare.

A Vision of Future Warfare

While the Defense Department's rationale for transformation is persuasive, its process for effecting transformation is more difficult to discern and, hence, to evaluate. A transformation process is needed to validate vision, to identify the best means for addressing critical challenges, and to determine if opportunities can be realized (and how soon, and to what degree). The process should enable feedback on transformation initiatives (e.g., new operational concepts, doctrine, systems, networks, force structures). This will enable senior Defense leaders to gauge whether the transformation path being pursued is, in fact, the correct path, or to make the appropriate adjustments if it is not. Such a process can help inform choices about investments in future capabilities—R&D, procurement, personnel and force structure—so as to reduce uncertainty in a resource-constrained environment.

Regrettably, the current Joint vision statement does not present such a compelling vision. The Joint Chiefs of Staff's (JCS) vision, set forth in *Joint Vision 2010*, and sustained in *Joint Vision 2020*, speaks in general terms of the need to achieve positional advantage over an adversary

("dominant maneuver"), engage the enemy effectively ("precision engagement"), support such activities efficiently and effectively ("focused logistics") while protecting friendly forces ("full-dimensional protection").[11] While these are desirable qualities for the US military to pursue, they offer little in the way of guidance as to how its missions (i.e., the character of key military competitions) might change over time (e.g., projecting power against an A2/AD; defending against asymmetric attacks on the US homeland). Indeed, stripped of their adjectives, the characteristics of effective "maneuver," "engagement," "logistics" and "protection" would be those desired by *any* military organization, in *any* era.

Joint Concepts of Operation

The next step along the transformation path is to identify "point-of-departure" concepts of operation that set forth, in significant detail, how the Services see themselves achieving critical operational goals, to include their role as part of a Joint team. As Secretary Rumsfeld rightly noted, "Exploiting the revolution in military affairs requires not only technological innovation but also development of operational concepts . . . ."

Why are such concepts of operation so important? Point-of-departure concepts of operation describe the military's hypothesis regarding how it intends to meet critical operational goals or exploit potential opportunities.

Although each critical operational goal requires a concept of operations, there are two in particular that merit attention, as the others are subsumed in them. The first is how we intend to defend our homeland from attack from ballistic and cruise missiles, the covert introduction of WMD, electronic attack on the information infrastructure, and terrorist attack.

The second concerns how the US military is going to project power against the (A2/AD) threat, and how power-projection operations will deny an enemy sanctuary. These critical goals are interrelated, and are also related to the other critical goals pertaining to information operations, space control, and creating C4ISR architectures.

At present, there is no point-of-departure *joint* operational warfighting concept for meeting these goals, either collectively (i.e., a grand integrated operational concept) or individually (e.g., an operational concept for defeating the A2/AD challenge). To be sure, the individual Services have developed operational concepts (e.g., Global Strike Task Force; Assured Access) that purport to address how they would meet a single critical challenge (principally A2/AD). However, they are rudimentary at best.

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[11] JCS, *Joint Vision 2020* (Washington, DC: DoD, 2001), pp. 4-5, 13, 20-27. To be sure*, Joint Vision 2020* notes the risks from changes in the conflict environment brought about by adversaries pursuing asymmetric strategies. The Joint Chiefs go on to say that such strategies are "perhaps the most serious danger the United States faces," that asymmetric advantages may be pursued on any level of warfare—strategic, operational or tactical—and that "adversaries may pursue a combination of asymmetries . . . ." The reader is further instructed that "asymmetric threats are dynamic and subject to change, and the US Armed Forces must maintain the capabilities necessary to deter, defend against, and defeat any adversary who chooses such an approach." Yet despite these general statements of concern there is little in the way of detailed discussion as to what form (e.g., anti-access, area denial) asymmetric threats might take.

Absent plausible concepts of operation oriented on the critical operational challenges, it is natural (indeed, perhaps inevitable) that the Services will gravitate toward existing doctrine and view transformation essentially improving current methods of conducting operations.

Thus until the US military devises a plausible joint operational concept (or, more precisely, concepts) for dealing with the critical emerging challenges, it seems very likely that transformation will be retarded. Moreover, absent such war-fighting concepts and a process for validating them, it will likely prove difficult, if not impossible, to obtain a reasonably accurate measure of how the transformation process is unfolding.[12]

In short, to determine whether or not a new (or prospective) capability is "transformational," (and whether a "legacy" capability should be preserved, and at what level), you have to have some sense of how you are going to address the critical operational goals laid down in the QDR. Since such concepts have either not been formulated, or are severely flawed, it is difficult to assess the relative merit of DoD budget or investment priorities.

Leader Tenure

By its nature, dramatic change in large military organizations almost inevitably involves a long-term process that spans a decade or more. However, the US military's institutional practices typically find senior leaders rotated out of their assignments every three or four years. This rotation cycle may work well for leaders whose responsibilities are near-term oriented (for example, the regional CINC who is responsible for the immediate warfighting mission in his area of operation). However, it is much less desirable in situations where a senior leader is tasked with the mission of effecting transformation.

Recent history shows that military organizations that have successfully transformed have almost always had a few key senior leaders—who both understood the new vision of the future conflict environment, and how to bring about change in large, complex military organizations— serve an extended tour of duty. This tour often runs double or even triple the length of a typical flag (i.e., general or admiral) officer tour in today's US military. During the German Army's transformation to blitzkrieg, for example, the head of its shadow general staff, General Hans von Seeckt, served seven years in that position. The American Navy's exploitation of naval aviation was shepherded by Vice Admiral William Moffett, who remained head of the Navy's Bureau of Aeronautics for twelve consecutive years. The absence of extended tours of service for *transformation-minded* senior US military leaders serving in key positions should give pause to those who are concerned about the US military's prospects for transformation.

A New Modernization Strategy

Military revolutions complicate modernization strategies in that they typically find the effectiveness of certain military systems in rapid decline. The displacement of the battleship by the aircraft carrier is but one example. However, it is far from clear in advance which military systems, operational concepts, or new force structures will work, and which will not. Put another way, not only does a transformation strategy need to be initiated well in advance of the actual

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[12] Note that concepts like "rapid decisive operations" (RDO) and "effects-based operations" (EBO) do not, by themselves, inform us in any significant detail as to how the six critical goals are to be addressed. They might be more accurately described as visions, rather than operational concepts.

fielding of the transformed force, it also must take into account military-technical uncertainty. How might our modernization strategy account for this?

For a start, the Services will have to tap into rapidly advancing technologies to develop new military systems that can be applied within the framework of new operational concepts executed by new kinds of military organizations. It is this combination of technology, emerging military systems, new operational concepts and force restructuring that often produces the discontinuous leap in military effectiveness characteristic of military revolutions.

Given the above discussion, one would expect to see the DoD accord greater emphasis on R&D efforts in support of "wildcatting"—experimenting with a limited (but operationally significant) number of a wide variety of military systems, as well as operational concepts, and force structures. The goal here is to identify those that are capable of solving emerging strategic and operational problems, or exploiting opportunities, while eliminating those that are not.

This reveals a second element of a successful modernization strategy for transformation: to avoid being "locked in." Lock-in occurs when limited resources are spent to purchase a system in large numbers. The result both narrows the range of options (as fewer types of systems are procured) for dealing with emerging challenges, and risks locking the force into the current state of technological advancement. Resources that could have supported exploring a wider range of systems and sustaining continued advances in technology are, instead, locked into the existing force.

As noted above, the end result may be a happy one—if the US military "guesses right" (i.e., if the fielded force serendipitously turns out to be the "right" force to meet the post-transformation challenges), and if the rate of technological advance slows. If not, the Defense Department risks having committed itself to a single-point solution in a very uncertain world. It will have either bought the wrong systems, or the "right" systems prematurely—before the rapidly advancing technologies that enable them have matured.

The US Navy understood this well in the 1920s and 30s, during the transformation from a battle fleet centered around battleships to one focused on fast carrier task forces. Early on it was unclear whether naval aviation would be optimized by spreading it throughout the fleet (e.g., having a few aircraft on every surface combatant), or concentrated on aircraft carriers. Moreover, it was also unclear what kind of carrier would be optimal. Consequently, the Navy created options for itself by wildcatting. It invested in four different classes of carriers, *but only produced six carriers in all.* It also experimented with aircraft on carriers and on surface ships, and even tried working with air ships.

Not only has wildcatting been an effective element of a modernization transformation strategy within the Services, but increasingly *among* them as well. Thus the Army, Navy and Air Force each had ballistic missile programs in the 1950s. The Air Force program led, ultimately, to the Minuteman ICBM, a key element of the U.S. nuclear strike mission force. The Army program was instrumental in the birth of the space program (its Jupiter rocket was used in the Redstone program), and the Navy program led to the Polaris submarine and the nuclear ballistic missile submarine force, a cornerstone of U.S. nuclear deterrence.

The end result of each of these wildcatting efforts was the creation of strategic "options" on a range of military capabilities. These options could be used both to dissuade prospective adversaries from resuming a high level of military competition and, in the event dissuasion or deterrence failed, exercising those options to prevail in the conflict itself. It is important to note that creating such options need not involve a defense budget "train wreck." Recall that the US military developed the foundation for strategic aerial bombardment, the carrier navy, modern amphibious warfare, and mechanized air-land operations during the relatively lean budget years of the 1920s and 1930s. What it does imply, however, is visionary leaders, and a different set of strategic—and budget—priorities.

Unfortunately, the Defense Department's modernization strategy today remains much the same as it was during the Cold War era, with its emphasis on large-scale, serial production of relatively few types of military systems and capabilities. To the extent possible, we should avoid premature large-scale production of new systems, be they legacy or transformational, until they have clearly proven themselves helpful in meeting critical operational goals. With respect to systems that are characterized as transformational, it is important to avoid the pitfalls of "false starts" and "dead ends."

False Starts. In periods of transformation, military organizations run the risk avoid buying large quantities of a promising system too early, and the US military is no exception. The risk of committing to a "false start" is demonstrated in the US Navy's affection for its first carrier designed from the keel up, the *Ranger*, which was commissioned in 1934. Although some Navy leaders had pressed for construction of five *Ranger*-Class carriers, wargame 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*.

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 transformation effort is not to avoid buying them too early; rather, it is to avoid buying them *at all*. The experience of the US 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.

The Key Role of Field Exercises and Experimentation
Field exercises are especially beneficial during periods of high uncertainty and rapid change, such as confronts us today. 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. In so doing, field exercises better inform modernization strategies for transformation, such as the one

described above, thereby enhancing their ability to employ limited resources more effectively. The QDR (quite correctly) declares, "Field exercises that incorporate experimentation—at both the joint and the service levels—provide an indispensable means for solving emerging challenges." Moreover, it states, "Exercises and experiments are a critical phase in developing new types of forces and operational concepts that can respond to emerging operational challenges and dominate opponents who effectively exploit aspects of the changing security environment."

The ultimate expression of such efforts will likely be the conduct of Service and 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.[13] Such exercises offer the best opportunity to obtain high-fidelity feedback on the likely value of new force designs, capabilities and operational concepts.

During the latter stages of the Cold War, the Services invested in a number of high-fidelity training facilities that greatly enhanced the value of their field training. For example, the Army's National Training Center (NTC) at Fort Irwin, California, prepared brigade-size units for combined arms mechanized warfare against a Soviet-style adversary. Similarly, the Air Force and Navy put their pilots through Red Flag and Top Gun air combat training, respectively.

In terms of a process for enabling transformation, the Department has provided a great deal of verbal support for Joint and Service field exercises and experimentation. As Secretary of Defense Rumsfeld stated, "All the high-tech weapons in the world won't transform our armed forces, unless we also transform the way we think, train, exercise and fight."

The QDR also notes "the Services invested in a number of high-fidelity training facilities that greatly enhance the value of their field training. Yet comparable facilities do not exist to support joint high-fidelity field exercises and experiments." Moreover, "Joint and Service field exercises oriented on military transformation have suffered from chronic resource shortages."

However, despite these numerous statements attesting to the value and importance of field exercises and experimentation to the transformation process, and pledges to pursue (indeed, expand upon) these activities aggressively, the FY03 defense program and budget submitted to the Congress provide for no significant change from the Clinton Administration's policies, programs and funding levels. Specifically:

- A Joint National Training Center is not established; nor is a Joint opposing force;

- Joint Forces Command has not had its exercise budget increased significantly over the FYDP; and

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[13] The Joint Chiefs of Staff have gone so far as to declare "The joint force, because of its flexibility and responsiveness will remain the key to operational success in the future . . . . To build the most effective force for 2020, we must be fully joint: intellectually, operationally, organizationally, doctrinally, and technically." JCS, *Joint Vision 2020* (Washington, DC: DoD, 2001), p. 2.

- The pace of joint exercises/experiments remains as established by the previous administration.

Required Military Capabilities

To meet this critical operational goals, we will need to transform our military into a fighting force that, relative to today's force—*and to the force that is currently envisioned in the QDR modernization program*—places substantially greater emphasis on the following characteristics:

- Mobility

- Stealth (in all its forms, to include undersea forces)

- Electronic protection

- Highly dispersed, electronically networked combat forces and supporting elements (e.g., logistics)

- Highly distributed insertion through nontraditional air and sea points of debarkation

- Extended-range systems and strikes

- Precision, electronic, and nonlethal forms of strike

- Unmanned/automated systems

- Compressed operational cycle rates

Transformation and DoD's Investment Portfolio: Skipping a Generation

During his candidacy for president, President Bush attracted a great deal of attention when he declared that the United States should

> modernize some existing weapon systems and equipment necessary for current tasks. But our relative peace allows us to do this selectively. The real goal is to move beyond marginal improvements—to replace existing programs with new technologies and strategies: to skip a generation of technology. . . . I intend to force new thinking and hard choices.[14]

The president's call to skip a generation of weapon systems in order to both better prepare for newly emerging challenges to the national security, and to exploit the potential of rapidly advancing military-related technologies is consistent with a modernization strategy during a period of military transformation.

Given this framework, what systems stand out as prime candidates for "skipping a generation?" What "leap-ahead" systems or capabilities are sufficiently attractive as to warrant such a move? Finally, how might the administration hedge against the possibility that in pursuing a leap-ahead capability, it may discover that the alternative system or capability, however promising it may appear today, cannot be realized in anticipated the time frame, or perhaps not at all? The

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[14] George W. Bush, Speech on Defense Policy, The Citadel, Charleston, SC, September 23, 1999.

following discussion presents three candidates for "skipping" a generation, and responds to the questions raised above.

The Joint Strike Fighter (JSF) (conventional take-off and land (CTOL), or Air Force, version)[15]

The administration has decided to move ahead with the JSF program established under the Clinton Administration. The current plan is to procure a total of 2,852 of these tactical fighters for the Air Force, Navy and Marine Corps, of which 1,763 would be Air Force CTOL fighters. To be sure, the JSF represents a significant improvement over each Service's existing tactical aircraft. However, the buy of the JSF CTOL version assumes the U.S. military will continue to enjoy unimpeded access to forward air bases for the indefinite future. Yet, as both senior defense civil and military leaders have stated, such access is already problematic, and will likely worsen over time. Indeed, developing new capabilities to defeat the anti-access/area-denial threat is considered a critical operational goal.

Leap-Ahead System: Extended-range Unmanned Combat Aerial Vehicles, or UCAVs. The role of unmanned systems has increased in recent US contingency operations in the Balkans and Afghanistan. Unmanned systems are also engaged in supporting US air patrols in Iraq (i.e., Operation Northern and Southern Watch). In Afghanistan the CIA employed armed Predator Unmanned Aerial Vehicles (UAVs) with Hellfire missiles. In effect, this made the Predator, which had been designed to perform a reconnaissance mission, a UCAV.[16] The Air Force has in development a UCAV whose principal mission will be the suppression of enemy air defenses ("SEAD"). The Navy has initiated a UCAV program of its own.

The opportunity exists to move much more aggressively in developing a range of UCAVs. Since UCAVs are remotely piloted, they can utilize the weight and space that would normally support the pilot for other purposes, such as to increase range or payload. They might also be designed to permit their launch and recovery from relatively austere landing strips. A combination of extended-range (and perhaps stealthy) Air Force UCAVs, sea-based Navy UCAVs, and distributed, land-based "tactical" UCAVs (for the Army and Marine Corps) would provide future commanders with a range of options for addressing the A2/AD challenge. Because they do not require pilots—or flight hours for pilot training and extensive ground maintenance—UCAVs also promise to reduce substantially manpower requirements, and operations and maintenance costs. Finally, UCAVs are also projected to cost between one-third and one-half the price of comparable manned combat aircraft.

Major Unknown Planning Factors: How many manned aircraft missions can be accomplished effectively by UCAVs, and how soon? While UCAVs have great promise, it is far from clear how many missions they can assume from the manned combat air arm, or how quickly they can be made to do so. It seems clear that UCAVs can almost certainly function as "reusable Tomahawks"; i.e., they can fly to a fixed target, drop a precision-guided munition (PGM), and

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[15] With the awarding of the JSF contract, the aircraft has been designated the F-35.

[16] Building on the CIA's success, in the just-submitted fiscal year (FY) 2003 budget, the Air Force proposes to procure 22 Predators configured to carry Hellfire missiles.

return to base. As the Air Force program indicates, UCAVs also show promise in performing the suppression of enemy air defenses (SEAD) mission. Another promising mission for UCAVs is the one they performed in Afghanistan: exploiting their relatively long loiter time to play an important role in the destruction of critical mobile targets (e.g., mobile missile launchers, terrorists).

Hedge: The JSF is viewed primarily as an efficient deliverer of precision munitions. But the US military has many options for delivering ordnance on targets over significant distances. The Defense Department can avoid locking in to a large JSF buy while also hedging against a slower-than-anticipated development of UCAVs with the following capabilities:

- Reopening the B-2 production line to enable the Air Force to redress the imbalance between its short- and long-range manned strike platforms.

- Increasing substantially the number of PGMs carried in the long-range bomber fleet through accelerating programs focused on small, smart munitions;

- Accelerating Army deep-strike capabilities (e.g., Comanche, ATACMS Block IIA, in addition to a tactical UCAV) to provide more survivable forward operating forces; and

- Continuing "bridge" production of F-16 Block 60s (Air Force) to address near-term tactical air fleet aging issues (e.g., increased maintenance requirements);

Current Status: The new defense program essentially ratifies the Clinton Administration's position to proceed with developing the JSF and purchasing 1,763 of the CTOL version for the Air Force.

The DD-21 Land-Attack Destroyer

The DD-21 Land-Attack Destroyer, with its large number of vertical launch systems (VLS), represented the Navy's effort to enhance its capabilities to support the battle ashore. With the Soviet Navy gone (and the "blue-water" threat with it), the Navy has rightly shifted its emphasis from open-ocean blue waters to littoral "green" waters. As it does, the Navy will encounter a very different threat environment. As noted above, the Defense Department considers this area-denial threat, in combination with the anti-access threat, a critical operational challenge.

In this environment, the DD-21s, whose size seemed likely to approach that of the first modern battleship (*HMS Dreadnought*), might have been so few in number (32 were planned) and so costly to replace that we would have been increasingly reluctant to deploy them into the littoral until friendly sea control had been established.[17] This made the DD-21 a poor fit for a defense strategy that calls on the military to "deter forward" and, in the event deterrence fails, be "capable of swiftly defeating attacks . . . from a forward deterrent posture."[18]

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[17] *HMS Dreadnought* displaced 17,900 tons. The DD-21 was projected to displace roughly 12-14,000 tons.

[18] *QDR*, pp. 20-21.

Skip a Generation Objective: The Streetfighter Concept employing Network Centric Warfare. The concept asserts that advanced information technologies are an asymmetric US advantage that can enable highly integrated, yet highly distributed, maritime operations. An effort should be made to explore the potential of squadrons of much smaller, faster, stealthier and less expensive surface combatants. These combatants could be more effective in supporting the campaign to seize control of the littoral and strike targets ashore. Owing to their substantially greater numbers and lower cost relative to the DD-21, such combatants could be employed both earlier and more aggressively in the littoral at far lower risk.[19]

Major Unknown Planning Factors: Is it possible for information technologies to create a "distributed" capital ship, and, if so, how soon? The idea of violating the principal of mass to gain the advantage of reduced vulnerability, while at the same time avoiding the penalty of reduced military effectiveness brought on by dispersion, is undeniably attractive. However, although the concept has been percolating for a number of years, and has shown promise in some wargames, the Defense Department has yet to produce small combatant prototypes that could be used to determine the potential of such a force. Introducing a squadron of such ships into the Navy's Fleet Battle Experiment (FBE) program could substantially increase DoD's understanding of the Streetfighter Concept and its viability for future maritime operations.

Hedge: As with the JSF, the DD-21 was viewed principally a strike platform. As noted, the US military has many different ways to conduct strike operations. Two readily available near-term maritime force hedges are:

- Converting the four SSBNs coming out of the nuclear deterrent force to SSGNs; and

- Increasing the quantity of PGMs to support existing surface combatant VLS tubes.

The Bush Administration's defense program exploits both options. Other strike hedges that should be pursued include those mentioned with respect to the JSF (i.e., Army deep-strike assets; increasing the PGMs aboard the bomber force; reopening the B-2 line, etc.).

Current Status: In November 2001 the Navy restructured the DD-21 program. In lieu of proceeding with the single DD-21 class of destroyers, the Navy has decided to develop a "family of advanced technology surface combatants," comprising a land-attack destroyer (DD-X), a guided-missile cruiser (CG-X), and a Littoral Combat Ship (LCS). It is far from clear, however, that this restructuring represents an effort to skip a generation in weapons development. Indeed, under the Surface Combatant-21 (SC-21) program, undertaken in 1995, the Navy planned to build both a land-attack destroyer and a cruiser variant. One potentially significant difference is the plan to build a Littoral Combat Ship (LCS), whose description generally conforms to the Streetfighter concept. At present, however, it remains unclear how vigorously the Navy intends

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[19] For an overview of the Network Centric Warfare and Streetfighter concepts, see Wayne Hughes, *Fleet Tactics and Coastal Combat* (Annapolis, MD: Naval Institute Press, 2000), pp. 145-67; and Vice Admiral Arthur K. Cebrowski and Captain Wayne P. Hughes, Jr., USN (Ret.). "Rebalancing the Fleet," *U.S. Naval Institute Proceedings* (November 1999). For a thoughtful opposing view of the littoral area-denial challenge, see Arthur H. Barber III and Delwyn L. Gilmore, "Maritime Access: Do Defenders Hold All The Cards?," *Defense Horizons*, October 2001.

to pursue the LCS program, or the role it envisions such combatants playing in addressing the anti-access/area-denial challenge.

The Crusader Artillery System

The Crusader artillery system represents a major advance in capabilities over the Army's current Paladin artillery system. As with the Joint Strike Fighter and Land-Attack Destroyer, however, the issue is not whether Crusader represents a major improvement over similar systems currently in the US military's inventory. Rather, it is whether opportunities exist to field a significantly different kind of capability that is more relevant for the new critical operational challenges the Bush Administration sees confronting the US military.

Today's Army finds itself challenged to become more of a rapidly deployable expeditionary force. Over the last decade the Army has had to deploy forces rapidly to areas where the Service had little in the way of forward-deployed forces, such as in Africa, the Balkans and the Persian Gulf. This has posed problems for the Army, as its heavy units require enormous amounts of airlift to deploy quickly, in addition to well-developed bases at their point of debarkation. Unfortunately, strategic airlift is very costly and thus, hard to come by. It also is in great demand by the Air Force. Moreover, less-developed regions of the world typically have modest transportation infrastructures, to include air base facilities.

This has led the Army to undertake an ambitious effort to transform its force structure to enable it to deploy substantial combat power quickly to a threatened region by air. A major effort is underway to reduce the weight of Army formations (thus reducing the demand on strategic lift) while retaining as much of their combat punch as possible. Hence the Army's Future Combat System (FCS) initiative, which, in part, hopes to displace systems like the 70-ton Abrams tank with a 20-ton FCS.[20]

Beyond losing weight while retaining muscle, the Army must develop the capability to project substantial land power rapidly, and sustain it indefinitely, in the absence of access to forward bases and large, fixed logistics centers, as called for in the QDR. This implies an ability to effect a distributed insertion of Army forces into a threatened area, as well as an ability to conduct highly distributed, or dispersed operations, employing C4ISR systems to scout the physical gaps between Army formations and extended-range fires to cover them.

Furthermore, the Army also needs to exploit its advantages in accessing joint C4ISR capabilities to conduct precision strikes at extended ranges. In so doing it can minimize the vulnerability of lighter forces by exploiting opportunities to outrange enemy ground force strike systems (e.g., artillery, attack helicopters).

While few will contest that Crusader is a superior system to the Paladin it is designed to replace, it is also true that:

- Plans call for the Crusader to reach the field around the same time the Army plans to field its new Future Combat Systems—a variant of which is intended to replace the Crusader. This

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[20] The Abrams weighs roughly 70 tons with its depleted uranium armor, and approximately 63 tons without it.

begs the question of why the Army would not pursue the FCS system more vigorously, especially given the likely spin-off benefits for other FCS configurations.

- The two Crusader vehicles are set to weigh about 80 tons, while the Paladin weighs 32 tons, and the FCS is planned to weigh no more than 20 tons. Given the great lengths to which the Army is going to enhance its forces' ability to deploy rapidly, it seems odd indeed that it would pursue an artillery system that weighed *150 percent more* than the system it is replacing, while at the same time designing a replacement for the Abrams tank whose specifications call for a *70 percent reduction* in weight.

- The greatest gain in Army artillery effectiveness will likely come from the Excalibur precision artillery round, now in development. But this munition can be fired from a Paladin system, as well.

- While it is true that the Crusader outranges the Paladin, the fact remains that other Army strike systems—to include the Army's multiple-launch rocket system (MLRS), HIMARS, Apache and Comanche helicopters, and prospectively Army UCAVs—outrange the Crusader. If greater emphasis on longer-range fires is needed, the Army has ready-made options for pursuing them other than Crusader.

- Even at its reduced weight (the system was originally designed at 110 tons), the Crusader will not fit on a C-130, violating a key Army design metric for both the Interim and Objective Forces.

- At a price tag of $11 billion (with $2 billion already having been invested), Crusader represents an enormous opportunity cost for an Army that cannot fully fund key elements of its Objective Force, to include support for developing strategic and intra-theater lift options, C4ISR capabilities, training facilities, and the Future Combat System.

Skip a Generation Objective: Army Deep-Strike Brigades (DSBs). The Army's challenge is less how to expand its traditional forms of fire support and more on how to deploy such firepower rapidly in an anti-access environment, and on how to exploit its unique potential among all the world's armies to see and strike at extended ranges. This is the direction the Army is headed in with respect to its vision for the Objective Force. Consistent with that vision, an Army Deep-Strike Brigade would emphasize long-range reconnaissance and strike assets. Such capabilities could include tactical UAVs and scout helicopters that can self-deploy and operate off of austere basing facilities; remote unattended ground sensors; long-range reconnaissance patrols; and support from sister Service C4ISR systems such as satellites and UAVs. As its name indicates, the DSB would also have the means to strike at long ranges with such systems as tactical UCAVs, attack helicopters and rocket artillery (e.g. HIMARS lightweight missile launcher employing ATACMS munitions).[21] Over the longer term, Future Combat System vehicles could both screen the DSB from the close fight and provide air defense. Among the programs that could be accelerated with the cancellation of Crusader would be Army UAV and UCAV programs, the Comanche helicopter, and development of extended-range versions of ATACMS.

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[21] ATACMS stands for Army Tactical Missile System, while HIMARS stands for High Mobility Artillery Rocket System.

Major Unknown Planning Factors: As noted above, it is not clear how quickly UAVs and UCAVs will mature. Nor is it clear to what extent they will be able to displace manned systems in performing the broad range of reconnaissance and strike missions. The Army's potential to see deep and to fight effectively at great range on a nonlinear battlefield has yet to be demonstrated in field exercises against an opposing force possessing the kinds of capabilities that might be encountered over the next decade in conflict against prospective adversaries.

Hedge: The Army can hedge against these uncertainties by upgrading or replacing its Paladin self-propelled howitzers with systems produced by our allies, such as the German PzH 2000. More importantly, perhaps, the Army can accelerate the procurement of the Excalibur smart artillery round.[22] As the experience of the last decade has shown, in terms of generating combat capability and military effectiveness, platforms are generally declining in importance relative to precision-guided munitions and to their ability to tap into the information provided by C4ISR networks.

Current Status: The administration's defense program retains the Crusader buy as outlined by the Clinton Administration.

Skipping "Skipping A Generation"?

To sum up, the Defense Department should heed President's guidance and seize the opportunity to skip a generation in military capability. Such an approach offers the following advantages:

- Options can be created for dealing with an uncertain future—and the risk of putting too many eggs in the short-range tactical aviation, large surface combatant, or heavy field artillery baskets—can be avoided;

- If successful, skip-a-generation capabilities outlined above promise to be far more effective in meeting the QDR's critical operational challenge of maintaining the US ability to project decisive military power to areas of vital interest in the face of the growing A2/AD threat;

- Would-be adversaries' knowledge that the United States is already moving to develop access to advanced military capabilities may serve as a powerful deterrent to their willingness to enter into a military competition with America—in short, skipping a generation can be a key element in the administration's dissuasion strategy; and, finally

- Relatively low-cost hedges can be put in place that guard against the uncertainty that the "leap-ahead" capabilities may not materialize as soon as forecast, or be as effective as anticipated.

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[22] The Excalibur, or XM982, is a family of precision-guided 155mm artillery munitions. Like other precision-guided munitions, the Excalibur is far more accurate than traditional (or "dumb") artillery munitions. Just as PGMs have greatly enhanced the strike capability of aircraft, so too do artillery PGMs offer the promise of greatly enhancing the effectiveness of existing artillery systems. See the *US Army 2001 Weapon Systems Handbook* at http://www.defensedaily.com.

THE PRICE OF FAILURE

The United States military must transform itself, and it must begin now. As Secretary Rumsfeld has said, "Transformation is not a goal for tomorrow, but an endeavor that must be embraced in earnest today. The challenges the Nation faces to not loom in the distant future, but are here now."

To its credit, the Bush Administration has both clearly defined what transformation is, and provided a persuasive case as to why the world's best military needs to transform. Unfortunately, it has not yet developed either a transformation strategy or a process to ensure that transformation will come about. This is most clearly demonstrated in the absence of plausible Service and Joint warfighting concepts for addressing the new emerging critical operational goals, and finds its ultimate expression in the administration's program and budget priorities, which for the most part sustain the course set by the Clinton Administration.

If we remain on this course—if the Defense Department fails to seize the opportunity to transform our military—we run a very real risk of investing a substantial sum of our national treasure in preparing our military to meet the challenges of today, and yesterday, rather than those of tomorrow. Should that occur, payment could be exacted not only in lost treasure, but also in interests jeopardized and in lives lost.

Thank you, Mr. Chairman, for the opportunity to present my thoughts on this important issue before your committee.