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# A Strategy for a Long Peace

Steven Kosiak

Andrew Krepinevich

Michael Vickers



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**CSBA** CENTER FOR STRATEGIC  
AND BUDGETARY ASSESSMENTS

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1730 Rhode Island Avenue, NW, Suite 912  
Washington, DC 20036



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Center for Strategic and Budgetary Assessments

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The Center for Strategic and Budgetary Assessments is an independent public policy research institute established to promote innovative thinking about defense planning and investment strategies for the 21st century. CSBA's analytic-based research makes clear the inextricable link between defense strategies and budgets in fostering a more effective and efficient defense, and the need to transform the US military in light of the emerging military revolution.

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1730 Rhode Island Ave., NW  
Suite 912  
Washington, DC 20036  
(202) 331-7990  
<http://www.csbaonline.org>

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# EXECUTIVE SUMMARY

Since the collapse of the Soviet Union, the United States has enjoyed a period of military dominance that, with the exception of the brief period at the end of World War II, is unsurpassed in our country's history. This has given America an opportunity presented to few countries in the course of recorded history: the opportunity to lead the way in creating the conditions for a long peace. But periods of extended military dominance are rare in history, and the current period will likely prove no exception. Nor can the US military's current advantages be sustained by a business-as-usual approach to defense planning.

The Strategy for a Long Peace presented here does not seek a *Pax Americana*. Instead, it calls for the US military to transform itself to maintain a significant margin of superiority over any potential rival, while leveraging key alliance relationships to extend our current military advantage and, by extension, global stability.

## THE FUTURE SECURITY ENVIRONMENT

Defense planning today occurs in an atmosphere of relatively high uncertainty. Although history shows that dominant powers have typically encountered challenges to their position, it is not clear what state or group might pose such a challenge to America's security, when that challenge might occur, or the form it will take. Several trends do, however, seem clear. One is that the sharp decline in competition among the great powers that followed the Soviet Union's collapse has begun to reverse. Another trend concerns the rise of great regional powers in East and South Asia. This, combined with the dissolution of the Soviet empire and the promise of an increasingly integrated European Union (EU), makes it likely that Asia will displace Europe as the focal point of greatest economic (and military) potential—and of US security concerns.

We are also experiencing the emergence of a global economy more highly dependent upon access to information, space and fossil fuels. The free flow of commerce increasingly depends not only on free access to the world's seas, but also to space and the electromagnetic spectrum. The development of major oil and natural gas resources in Central Asia also may find this remote area growing in geopolitical significance.

All this is occurring at a time when America increasingly finds itself leading coalitions of the willing, rather than relying on formal alliances, to conduct peacekeeping and other contingency operations around the world. Yet, at the same time, the United States will most likely find itself increasingly in need of durable and reliable allies. This will stem from the geopolitical and economic trends noted above. But it will also arise because an emerging military revolution (or revolution in military affairs (RMA)) will force the United States to divert increasing levels of resources to defending its homeland, and because sustaining America's military advantage will require it to transform its military.

The military revolution now under way promises to change conventional warfare on a scale not seen since the period between the two world wars. Such transformations of war typically displace, or even render obsolete, some formerly dominant weapons and forces central to the



previous military regime. For example, US power-projection operations will become more difficult to execute as even second-rank military powers develop and deploy anti-access/area-denial capabilities, putting fixed, forward bases (and perhaps maritime forces in the littoral) at high risk for destruction. Meeting this challenge will require the United States to transform both its power-projection forces and its global basing structure. Furthermore, along with reorienting its primary focus from Central Europe to East Asia, the American military also will likely find itself confronting new forms of blockade, the challenge of maintaining US superiority in space, the growing incidence of urban conflict, and the use of information warfare, both as a means of gaining advantage on the battlefield and threatening a nation's economic infrastructure. To this must be added the need to cope with this military revolution's empowerment of small groups, to include irregular forces, terrorist groups and transnational criminal organizations, with weapons of mass destruction and disruption.

## THE QDR: A FLAWED BLUEPRINT

Unfortunately, the United States' current defense program, as developed by the Defense Department's Quadrennial Defense Review (QDR), does not provide the kind of strategic blueprint needed to meet these emerging threats. While the need to transform the US military has been voiced by the Secretary of Defense and the Joint Chiefs of Staff (JCS), thus far little has been accomplished toward this end. To paraphrase an old admonition, "Transformation" is something that is heard, but not seen.

Yet, if the US military is not transformed, it may lack the military capabilities needed to sustain a long peace. At the same time, the US military must remain capable of preserving stability all along its transformation path. This means America must maintain sufficient military capability in the form of forces that are ready to address today's security requirements at an acceptable level of risk.

Some risk must be accepted. America's wealth, great as it is, is not unlimited. Moreover, while both political parties have essentially stated their willingness to sustain defense budgets at their current level, neither has called for providing any significant increases. Even more sobering, the current defense program suffers from a plans-funding mismatch of some \$120 billion over the next six years (using the February 2000 Clinton defense plan as the baseline), with even greater shortfalls thereafter. Furthermore, neither political party appears ready to add the resources required to erase this shortfall. Consequently, the current defense program cannot avoid substantial trimming, even if transformation is not undertaken.

This would be bad news—if the current defense program offered the best way to address America's security needs. But it does not. The current defense program focuses much of its efforts on creating and sustaining forces that are ready and capable of waging large-scale warfare in two separate theaters in overlapping time frames. This two-Major Theater War (MTW) posture that drives a good portion of US readiness and force structure requirements is an increasingly poor metric by which to gauge the effectiveness of our defense strategy and program. Today's Iraqi threat is far smaller in scale than that posed in 1991. As for Iran and North Korea, the threats they pose are centered more around embryonic anti-access/area-denial capabilities than on attempts to create their version of a large Republican Guard-like

mechanized, heavy land force, or a poor-man's version of the US Air Force. In short, the kind, or *form*, of the challenge presented by these rogue states is different from the threat posed by Iraq during the Gulf War. *Thus even the Defense Department's excessive emphasis on minimizing the near-term risks to America's security is being accomplished in a relatively ineffective manner.*

The same can be said of forward-presence operations, the other major generator of US near-term force requirements. The use of Cold War era metrics, such as the number of carrier battle groups and amphibious ready groups forward deployed, still dominate—this, even though other, lower-cost, means of providing effective forward presence are now available.

Of perhaps greatest concern, however, is that the current defense modernization program places far too heavy an emphasis on sustaining an improved version of today's military—as opposed to a transformed military—as the best means for maintaining US military advantages over the long term.

## MILITARY TRANSFORMATION

*If one concurs with the authors' diagnosis of the emerging security environment, the following strategy offers one approach for dealing with it effectively.* This strategy employs a range of means to support transformation within projected resource constraints, while also incurring minimal increased risk to near-term US security interests, and addressing the substantial mismatch between the QDR defense program and the budgets projected to sustain it.

Transforming the US military is at the core of our Strategy for a Long Peace. Transformation requires a broad approach, comprising six elements:

- *A future warfare vision that will impart direction to transformation efforts.* This vision would focus the military on key emerging challenges, such as power projection in an anti-access/area-denial environment, urban eviction and control, space and information control, and homeland defense, and would explicitly anticipate greater future reliance on extended-range power projection, network-based forces, stealth, and unmanned systems.
- *Selection of senior leaders based on their ability to effect transformational change.* An ability to lead transformation efforts should be a central criterion for selection as JCS Chairman and Vice Chairman, and Service chiefs and vice chiefs.
- *Robust funding for leap-ahead technologies and sustained experimentation.* To create a portfolio of real transformation options, several billion dollars will need to be added to the science and technology (S&T) accounts over the Future Years Defense Program (FYDP). Among the technologies that should be aggressively pursued are those for distributed, micro-satellite constellations; space-based radars with moving target indicator capabilities; unmanned systems, to include micro-robots and micro-UAVs; performance-enhancing exoskeletons; next-generation stealth, including applications to air mobility aircraft, surface naval vessels and ground combat systems; hypersonics and directed-energy systems; and micro-proximity satellites for space control. To identify the proper mix of new systems incorporating the above characteristics, and the number of legacy systems required to meet

emerging challenges, an ongoing series of Service and Joint transformation exercises must be conducted, oriented principally at the operational level of warfare. To this end, a Joint National Anti-Access/Area-Denial Training Center should be established, along with a Joint Urban Warfare Training Center. The military services should establish standing opposing forces at these centers, which can be brought together under Joint Forces Command to form a Joint Opposing Force.

- *Creation of the organizational slack necessary for innovation and institutional reform of the Department of Defense (DoD), the armed forces and the defense industrial base.* Freeing up human resources for transformation will require a critical review of current approaches to overseas presence, existing war plans and higher military education. Measures to increase competition in the defense technology and industrial base, increase incentives for independent research and development (IR&D), and bolster the profitability of new systems development are also needed. As transformation progresses, institutional change will likely be required of DoD and the armed forces, which could range from the creation of a new Service, to new career paths and institutions of higher learning.
- *A procurement strategy in the near- to mid-term that emphasizes limited production runs of a wide range of new systems and service-life extensions and upgrades of existing systems.* Until uncertainty is resolved concerning which new systems will be needed for future operations, and the technological flux likely to be associated with these systems has been substantially reduced, DoD's procurement strategy should emphasize limited production runs of a wide range of systems. Where force structure concerns mandate expansion in fleet size or recapitalization, service-life extensions (e.g., Los Angeles-class attack submarines) and upgrades to existing systems (e.g., F-16 Block 60s) should be pursued to the maximum extent feasible.
- *Divestment strategies to eliminate capabilities that are a poor fit with the emerging strategic environment and to free up resources to support transformation.* Transformation requires a divestment strategy, irrespective of the size of the defense top line. Divestment will be required to finance transformation, to retire or forego capabilities that are a poor fit with the emerging strategic environment and to swap legacy capabilities for transformational ones.

## MEETING NEAR-TERM SECURITY REQUIREMENTS

A range of initiatives can be undertaken to enable the US military to meet near-term security requirements, within existing and projected budget constraints, while incurring little increase in risk and also enabling transformation. These initiatives include:

- *Refocusing the Two-War Posture.* Greater reliance should be placed on South Korea to provide ground forces for its defense. Similarly, if and when the Europeans field a rapid reaction force, they should be encouraged to make it available for a Persian Gulf contingency.
- *Restructuring Forward Presence.* The Navy should make use of the growing strike capability of its submarine forces and surface combatants to create innovative forward-presence force

packages, to include the use of Surface Action Groups (SAGs) and cruise missile submarine (SSGN) Stealth Battleships. Accordingly, the four Trident ballistic missile submarines (SSBNs) scheduled to come out of the nuclear deterrent force should be converted to SSGN conventional strike platforms. Air Expeditionary Forces should be used to gap maritime forces, as appropriate. Those NATO allies with sizeable maritime forces should be encouraged to take on a greater role in conducting maritime forward-presence operations in the Mediterranean Sea, enabling US maritime forces to reorient themselves more toward the Persian Gulf, South Asia and East Asia. These initiatives will reduce the stress on carrier battle groups and amphibious ready groups, while enabling the transformation of US maritime forces.

- *Enhanced Peacekeeping.* The Army should orient a significant part of its force structure—six so-called interim brigades—to peacekeeping operations, along with a like number of National Guard brigades, in recognition that such operations are likely to represent an enduring requirement. Efforts also should be made to support the peacekeeping forces fielded by America’s allies—such as Australia and Canada—which play an important role in policing democracy’s empire.

The Strategy for a Long Peace also provides increased funding on a per troop basis over that which is currently projected to ensure that US forces maintain themselves at acceptable levels of readiness.

## MILITARY SERVICE TRANSFORMATION INITIATIVES

The Strategy for a Long Peace emphasizes developing forces that can best meet the types of emerging challenges noted above. This means forces that can strike with precision from extended range; incorporate stealth into their design; emphasize mobility vice armor for defense; form part of a robust, comprehensive command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) architecture; are capable of defending themselves against a range of electronic and information attacks; avoid reliance on large, vulnerable fixed bases for insertion or sustainment; and avoid overly concentrating combat power in a few platforms.

The Army should proceed with its current transformation effort, but it should be modified to better address emerging threats, as well as existing requirements. This means earmarking one division (and associated National Guard units) to conduct field exercises oriented on solving the anti-access challenge, developing an advanced capability to conduct urban control and eviction operations, and exploiting the potential of ground forces to see deep and engage at extended ranges. Within this framework, the Army should proceed with its Future Combat System (FCS), high mobility artillery rocket system (HIMARS) lightweight missile launcher, and the Army tactical missile system (ATACMS) Block IIA missile, and accelerate efforts to develop unmanned combat vehicles, and other forms of robotics. The Service’s mobility requirements should be supported through research and development (R&D) of an Advanced Technology Transport (ATT), Quad-Tilt Rotor (QTR) transport, stealthy air transport for use by special operations forces, and rapid, over-the-beach sealift. The Crusader artillery system does not fit the transformation force characteristic profile and should be terminated.

Navy and Marine Corps Fleet Battle *Exercises* should be mainstreamed into ongoing fleet training to explore the potential of new means and new forms of operation to deal with anti-access/area-denial threats. To this end, the two Services should accelerate their efforts to determine the utility of the Streetfighter concept, Network-Centric Warfare, and Operational Maneuver From the Sea. The Navy should develop and purchase a small number of Streetfighter combatants and convert four Trident SSBNs to SSGNs, while continuing to develop the CVX and DD-21. New means of conducting strikes at extended ranges, to include the advanced gun system (AGS) and unmanned combat air vehicles (UCAVs), should be accelerated. To maintain an adequate undersea warfare capability, Los Angeles-Class submarines scheduled to be retired before the end of their useful lives should be refueled and retained in the fleet. A Joint Mobile Offshore Base (JMOB) prototype should be deployed to determine its utility as an alternative to increasingly vulnerable fixed, forward bases.

Reflecting the demands of an anti-access/area-denial warfighting environment, the Marine Corps should proceed with its MV-22 buy, but significantly reduce its purchase of the advanced amphibious assault vehicle (AAAV). Similarly, the Joint Strike Fighter (JSF) should be cancelled, with any near-term shortfall in aircraft production gapped by the F/A-18E/F (for the Navy and perhaps, the Marine Corps) and F-16 Block 60 (for the Air Force). Alternate means of survivable strike support—to include land- and sea-based missile forces and UCAVs—should receive increased emphasis.

The Air Force should accelerate its efforts to insure that the US military will dominate any future military competition in space and along the electromagnetic spectrum. Both challenges promise to be daunting, given the difficulty in identifying where the greatest threats may emerge, and how they might manifest themselves. The Service also needs to emphasize efforts to deal with the anti-access/area-denial challenge. The Air Force should accelerate its efforts to develop extended-range, long-endurance unmanned aerial vehicles (UAVs) and UCAVs. Congress should be petitioned to restore funding for the Discoverer II prototype radar satellites. The Service's long-range, precision-strike systems will likely play an increasingly important role in future operations. At present, the B-2 bomber is the Air Force's only long-range, stealthy, penetrating strike asset and, as such, an important hedge against the growing vulnerability of forward-based aircraft. Service and Joint exercises should accord high priority to assessing the B-2's considerable potential for addressing the anti-access challenge. If these exercises confirm this potential, the B-2 production line should be restarted and significant additional numbers of the aircraft procured. Unless the Air Force can demonstrate that the F-22 is both critical and survivable in the emerging anti-access/area-denial warfighting environment, its procurement should be limited to fielding a silver-bullet force.

## HOMELAND DEFENSE

While deploying an effective national missile defense system in the near term would be highly desirable, it is not a currently available option. Funding should not be siphoned away from national missile defense (NMD) research and development efforts, and into the procurement and maintenance of a system of suspect effectiveness. Rather, promising NMD options should be vigorously pursued with an eye toward exploiting cutting-edge technologies in an effort to

develop more effective systems. Any eventual decision to deploy an NMD must account for the potential reaction of other nuclear powers, especially China and Russia.

An NMD deployment decision should be made within the context of a comprehensive approach to homeland defense from a weapons of mass destruction (WMD) attack to include defense against cruise missile attack and covert use of biological and radiological weapons. Increased emphasis must also be given to bolstering the nation's defenses against attacks on the information infrastructure. To gain a better understanding of missile defense operations and force structure requirements, theater missile defenses—whose performance standards are significantly lower than those for an NMD system—should be deployed as soon as they become feasible.

## THE NUCLEAR FORCES

The declining capabilities of the Russian nuclear forces, the associated reduced targeting requirements for US nuclear forces, and the growing potential of precision and electronic weapons to cover certain strategic targets once reserved for nuclear strikes suggest that significant funding could be shifted to support transformation initiatives by reducing our reliance on nuclear forces. Accordingly, the United States should take steps to pare its nuclear force levels to 2,500 warheads.

## ALLIANCES AND BASING

If the United States is to preserve stability in key regions around the globe so as to sustain a long peace, it will find itself increasingly dependent upon allies for support. However, the emerging changes in the geopolitical and military-technical environments will lead America to seek different qualities in its relationships with its allies. A new division of labor will have to be arrived at that takes into account: ally durability and reliability; the new missions brought on by the military revolution (e.g., precision strike, space control, strategic information warfare, ballistic and cruise missile defense, power projection in the absence of fixed forward bases); and the likely shift in America's principal security focus from Europe to Asia. To this end the United States should accord high priority to:

- exploring the potential to reduce emphasis on transferring advanced military capabilities to allies in lieu of providing such support on a temporary, or loan, basis. Candidate capabilities would include the US global C4ISR, missile defense and high-fidelity training architectures, as well as advanced precision-strike munitions (PGMs).
- supporting the efforts of selected allies to develop advanced military capabilities. For example, assistance might be provided to enable Australia, Israel, Japan, NATO Europe, and the Republic of Korea to develop their own anti-access forces, to include missile defense capabilities. Great Britain might be supported in its efforts to create power-projection forces that can operate effectively against anti-access forces and, along with Australia and Japan, to create forces to frustrate multi-dimensional (i.e., land-, space- and sea-based) blockades and threats to maritime commerce.

- migrating toward a new global basing architecture as a means of: hedging against the likelihood that future alliance relationships will be less predictable than they have been over the past 50 years; countering the growing risks involved with traditional reliance on fixed, forward facilities; and recognizing that Asia, rather than Europe, will more likely be the region where US security interests are at greatest risk.

Restructuring alliance relationships to meet these requirements will take years, perhaps a decade or more, to accomplish. Yet the geopolitical and military revolutions that will likely stress US alliance relationships and key regional military balances are already well under way. Hence it is no exaggeration to say that a strategic assessment of America's alliance relationships should be undertaken now, while the opportunity to shape the future is at its greatest.

## ENDS AND MEANS: REALISTIC AND RESPONSIBLE DEFENSE PLANNING

The transformation initiatives summarized above and outlined in the text that follows are more than offset by the reductions in the QDR program's planned buys of Cold War legacy systems, along with modest reductions in force structure. However, realistic planning demands that any strategy also account for the \$120 billion mismatch between the QDR defense program and projected defense budgets.

The Strategy for a Long Peace addresses this problem in three ways. First, it hopes that current efforts underway in the Defense Department to bring about greater efficiencies bear fruit. If history is any guide, however, these initiatives will realize only a small fraction of their anticipated savings. Second, this strategy relies, over time, on America's allies to shoulder a moderately larger share of the responsibility for our common security. Third, it effects reductions in the US military's force structure but does so in such a way as to incur little increase in near-term risk while offering the possibility of greatly reduced long-term risk—i.e., a long peace.

In short, there is no free lunch. There is no consensus on either side of the political aisle for a significant increase in defense resources, and the practice of raiding the procurement accounts to shore-up near-term readiness needs to stop. Thus the Army reforms around an eight-division active force. The National Guard is reduced by four divisions, but retains its entire force of Enhanced Separate Brigades (ESBs). The Navy and Marine Corps go from twelve carriers and Amphibious Ready Groups (ARGs), respectively, to ten, while the Corps also is reduced by one Marine Expeditionary Brigade (MEB). The Air Force sacrifices some force structure as well, moving from twenty tactical fighter wing equivalents to seventeen, within its new Aerospace Expeditionary Force (AEF) structure.

Some will argue that a smaller force structure means taking on some near-term risk, and they are right. But, done within the strategy outlined in this paper, the added near-term risk is small. The alternative is to accept much greater risks to America's long-term security. Sustaining the current force structure ignores the need to transform the military so that it will be able to meet the very different—and far more formidable—kinds of security challenges America will confront tomorrow. In the final analysis, strategy is about making choices—about setting priorities for how limited resources are apportioned. The Strategy for a Long Peace provides a far better, far

more realistic and far more responsible point of departure than does the QDR for achieving the overarching goal of any defense posture: to maximize the opportunity for achieving the nation's security objectives, the greatest of which is a peace that preserves our vital interests in our time—and in our children's time as well.



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# I. INTRODUCTION

## A WORLD TRANSFORMED

Since the collapse of the Soviet Union, the United States has enjoyed a period of military dominance that, with the exception of the brief period at the end of World War II, is arguably unsurpassed in our country's history. But, periods of extended military dominance are rare, and the current period will likely prove no exception. If the United States is to extend the relatively high level of security it has enjoyed in the 1990s into a long peace, as is this strategy's goal, it will almost certainly need to preserve its current military advantage and the beneficial effect it has on global stability. This must be accomplished within the limits of the human and fiscal resources that can reasonably be expected to be provided for defense.

This strategy does not seek a *Pax Americana*, or benign American hegemony over the world. Instead, it calls for the United States to remain an active global power, clearly first in military capability among the great powers, with strong emphasis on key alliance relationships, particularly those with the NATO states, Australia and Japan, as one of the principal means of extending our military advantage and, by extension, global stability. Second, it assumes a willingness to resist, by force if necessary, the use of coercion or force by other states or entities to upset the status quo in ways that threaten US vital interests.

America's principal competitors will likely be those states that can threaten its enduring vital interests and which are disposed to do so. These interests include ensuring the physical security and material well-being of the United States and its citizens. They also include preventing a hegemonic power from exerting control over key regions, such as Western Europe, East Asia and the Persian Gulf, while preserving the US position in the Western Hemisphere. To this might be added freedom of the seas, space and access to the electromagnetic spectrum. We should be concerned about maintaining favorable military balances in these key regions, and in key functional areas of the competition, such as in space and in information warfare, to prevent the emergence of a regional hegemon. This is not to say that any rising (or recovering) great regional power, such as China, India or Russia, will aspire to hegemonic status within its region or to threaten key US interests. If history is any guide, however, the United States will be challenged to maintain a stabilizing distribution of military power in regions where it has vital interests. One also cannot discount the possibility of our vital interests being seriously challenged by non-state actors.

Today we find ourselves allied with states that joined with us to contain an expansionist power that no longer exists and to counter an ideology that is in thorough disrepute. Yet it is worth noting that these alliances were also formed because the United States and other states shared enduring interests. Thus America should attach high priority to retaining its alliance relationships with Germany (and the other major NATO powers, Britain and France) and Japan. The objective is to ensure that a favorable balance of power exists in those regional and functional (e.g., space) areas where the US vital interests are at stake and to deny would-be competitors the opportunity to enter into counter-alliances with these states.

This paper is organized into 15 chapters. Chapter II provides an assessment of the emerging security environment. This is followed by discussions of the current defense posture's strategic relevance and resource challenges. Chapter IV lays out a strategy to transform the US military to meet the objective of securing a long peace. The succeeding chapters—V–VIII—explore how this strategy meets current military requirements, and what transformation means for the military services. Chapters IX–XIII address items of particular importance that do not fit neatly within Service boundaries, such as homeland defense, the nuclear forces, the defense industrial base, America's allies, and our global basing structure. The paper closes with a summary of the strategy's fiscal requirements.

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## II. THE CHANGING SECURITY ENVIRONMENT

### RISING POWERS AND ECONOMIC TRANSFORMATION

Despite the United States' current dominant military position, crafting a defense strategy to function as a cornerstone of global stability is no easy task. Strategic planning today occurs in an atmosphere of relatively high uncertainty stimulated by major—and perhaps fundamental—geopolitical, economic and military-technical change.

Geopolitically, the last decade has witnessed the collapse of communism and the rapid decline of ideology as a source of conflict. The same period has been marked by the continued emergence of an increasingly global economy and the profound effects of an economic revolution paced by rapid advances in information technology, whose effects may be as far-reaching as those induced by the Industrial Revolution two centuries ago. The accelerating rate of technological change also promises to effect a transformation in the character of conflict, or a military revolution, that will almost certainly exert a profound influence on the doctrine, military systems and force structures needed to extend the US military's current advantage beyond the near- to mid-term future.

The greatest economic growth in the foreseeable future is still likely to be in Asia. The associated growth in US trade with Asian states, combined with their rapidly growing military potential, will also see this region grow in strategic importance. Twenty years from now it is quite possible that the world's three largest economies, after our own, will be found in Asia (i.e., in China, India and Japan). According to some estimates, over the next two decades China's GDP may grow to exceed half that of the United States, a level of economic might that no other power has achieved for nearly a century. Japan will almost certainly remain a major economic power. Over the next quarter century, some projections see India emerging as the world's most populous state, with the largest middle class and with a GDP that could rank behind only that of the United States and China. If the gradual integration of Europe continues, the next two decades could witness an economically integrated European Union with an economy greater than that of the United States. In short, the world will likely become increasingly multipolar economically, with the United States' relative share of the global economy slipping somewhat in relation to that of rising great regional powers. This, of course, has significant implications for the relative military potential of these states, the military balance of power and US calculations with respect to its long-term defense posture. In short, while the United States seems almost certain to remain the world's preeminent power for the foreseeable future, its relative position seems likely to decline somewhat from where it stands today.

At the same time the United States will likely experience a relative decline in power, it also may find itself with additional interests to defend. Just as the race for colonies over a century ago led to increased competition between imperial powers, the race to exploit the economic potential of space may bring the United States into competition with other states. Competition might occur over access to key orbits or bandwidth, both for military and commercial purposes. If so, the struggle to gain an advantage in space would likely intensify greatly. While the United States currently dominates in space, that position also seems likely to erode over time. The US (and

global) space architectures may increasingly be driven by the private sector and dominated by commercial—not security—concerns. The commercial sector will both shape the US space architecture and offer other states and groups access to space, both for commercial purposes and for support of military operations. The continued growth of other states' national satellite systems will provide still another source of access for the world's militaries.

The boom in energy development that is now under way in Central Asia may see that region become a major source of oil and gas for the global economy. If so, Central Asia may well become the focus of increased geopolitical competition. It is possible that Russia or, more likely, China—and perhaps even India—could emerge as competitors for influence in the region. Iran and Turkey could exert significant influence on the region as well. The United States may have a strong interest in the area's stability and in the independence of its constituent states.

The Information Revolution, like the Industrial Revolution before it, has the potential to shift growth rate patterns. Economic advancement will likely center on information-related technologies and, later, on biotechnologies. Unlike the proprietary technologies that spawned the nuclear weapons/ballistic missile revolution, these technologies will be widely available in the commercial sector and thus to potential competitors and adversaries. At the same time, the Information Revolution will facilitate the concentration of ever-greater destructive power in the hands of small groups and individuals. Specifically, we can expect to see this take the form of their growing access to weapons of mass destruction, specifically chemical and biological agents, and—with growing information awareness, connectivity and lethality—the potential to disrupt a major portion of the growing national (and global) information infrastructure.

At the same time, the growing global awareness spawned by the Information Revolution could make it more difficult for regimes, especially those of multiethnic states, to tamp down internal dissent. This may, at some point, exert centrifugal effects on states like China, India and Indonesia, each of which have significant internal ethnic minority problems.

## THE MILITARY REVOLUTION

The consequences of an emerging military revolution must be considered along with the political and economic forces shaping the future security environment. Military revolutions have occurred periodically for centuries. Often they are stimulated by major surges in technology that facilitate a discontinuous leap in military effectiveness over a relatively short period of time. The last military revolution in conventional forces occurred between the world wars, when mechanized armored forces came of age on land, aircraft carriers supplanted the battleship at sea, and strategic aerial bombardment was established as a new way of war. In mid-century the world witnessed the introduction of nuclear weapons, once again leading strategists to rethink, in fundamental ways, the calculus of war.

These transformations of war typically displace, or even render obsolete, some formerly dominant weapons and forces central to the previous military regime. Just as dramatic technological advances in mechanization, aviation and radio stimulated a transformation in the character of conflict between the two world wars, today the United States is confronted by the challenge of interpreting the implications of a revolution in information and information-related

technologies. These offer military organizations the potential to know much more about their adversaries than they ever have before. The *potential* exists to locate, identify and track a far greater number of enemy forces and supporting elements, over a far greater area and for far longer periods of time, than has ever before been possible. Of course, if or when this potential is realized, it will become important to deny the enemy similar information concerning friendly forces, perhaps through such means as stealthy systems and dispersed operations supported by extended networks of systems and forces. The military revolution also is characterized by the advent of conventional weapons capable of engaging their targets with far greater lethality, precision and discrimination, over a broad geographic area, and in far less time than had previously been possible.

Military revolutions have a way of transforming existing military operations and of also creating new forms of military operations. For example, the naval revolution of the late 19th century saw battle fleet operations oriented on sea control change dramatically, as metal-hulled, steam-propelled ships armed with long-range rifled guns supplanted the wooden sailing ships-of-the-line armed with short-range, smooth-bore cannons. The development of long-range submarines and extended-range torpedoes led to the advent of the strategic submarine blockade—an entirely new form of military operation.

Owing to the unusually high level of geopolitical and military-technical uncertainty, it is difficult to predict with confidence the character of the military competition a decade or two into the future. Simply put, the United States cannot know with precision what state (or coalition) will pose the next major challenge to its security, when that challenge will occur or how it will manifest itself. Similarly, the United States does not know when key military technology breakthroughs will occur, who will effect these breakthroughs, how they will be applied to military systems and doctrine, and what form they will take. For example, in the early 1920s it was not possible to know how rapid advances in emerging technologies pertaining to mechanization, aviation and radio would play out two decades later. Nor was it yet clear which paths military organizations would take to exploit them (i.e., that Germany would pursue blitzkrieg, the United States and Japan carrier aviation, Great Britain and the United States strategic aerial bombardment, etc.).

It is possible, however, to narrow the range of uncertainty somewhat by examining major geopolitical, military-technical, economic, and demographic trends with an eye toward identifying key areas of future military competition. Such an exercise yields a competitive environment characterized by the challenges briefly described below.

### Power Projection and the Anti-Access/Area-Denial Challenge

The US military's century-old reliance on access to fixed, advanced bases when deploying and sustaining military forces overseas will very likely come under unprecedented risk over the next two decades. With the advent of ad hoc coalitions, it cannot be assumed that prospective allies will provide base access. Evidence of this can already be seen in Greece's refusal to provide bases during Operation Allied Force and the denial of base access for strike operations by Saudi Arabia and Turkey during Operation Desert Fox. America's forces may also find themselves operating in areas (e.g., the Spratlys, South Asia) where no major basing structure exists. The

challenges inherent in such a contingency were recently on display in microcosm during Operation Allied Force in the spring of 1999, when the US Army's Task Force Hawk experienced great difficulty in deploying rapidly into Albania and maneuvering to cover the border with Kosovo.

Of greatest concern is the rapidly growing access of military organizations to space for reconnaissance and targeting purposes, combined with the proliferation of missile and WMD technology. This could allow even rogue state militaries to hold key forward ports, air bases and supply centers at risk. Owing to the expansion of NATO (and American security commitments) further into Eastern Europe, and the development of major energy reserves in Central Asia, the United States cannot rule out the possibility that, in the next decade or so, it may also need to project power far inland, in the absence of major base access or base availability.

America's maritime forces will probably play an increasingly important role in supporting power-projection operations in the absence of forward bases. In so doing, the US Navy will likely find itself operating in the littoral, thus radically shrinking an adversary's search requirements, while also enabling an enemy to bring more of his military power to bear and greatly reducing the fleet's attack warning time. America's maritime forces can expect to encounter an enemy's green water naval forces, to include submarines and stealthy, small surface combatants, along with sophisticated anti-ship mines operating in conjunction with its land- and space-based sea-denial assets. This combination of capabilities focused on the littoral region could enable an adversary to conduct effective area-denial operations at the same time the Navy is reorienting the fleet to emphasize enabling and supporting military operations ashore and, hence, operating increasingly in the littoral. Traditional forms of over-the-beach amphibious assault will become progressively more difficult, if not prohibitively costly, in such an environment.

## Space

The Gulf War witnessed the emergence of space-based systems as key supporting elements of ongoing military operations. During the 1990s, the US military has increasingly relied on space-based systems for its effectiveness and this trend shows no sign of abating. However, the near-monopoly in space enjoyed by the United States over its adversaries throughout the past decade is almost certain to come to an end in the not-too-distant future, with the growth of national satellite architectures and the commercialization of space. Two principal consequences will ensue from this phenomenon. First, it will force the United States to consider how it will defend a rapidly growing economic asset. Second, in times of crisis and war, the United States may find itself in a competition to control space. This could be a formidable challenge, both because of the growing number of states and commercial firms with space-based assets and the potential difficulty of identifying whether access to satellite capability support (e.g., imagery, sensing, communications) has, in fact, been denied to an adversary.

## Sea Control, Sea Denial and Threats to Maritime Commerce

The diffusion of the capability to monitor relatively large, soft, fixed targets at great distances and to hold them at risk will influence the military competition at sea as well as on land. This

will be particularly true as militaries acquire the ability to track and engage, at extended range, relatively slow-moving maritime vessels (e.g., surface combatants and merchant vessels) operating in restricted waters (e.g., in straits, the approaches to major ports). Consequently, militaries will likely confront challenges to maritime commerce that employ traditional capabilities like submarines, advance anti-ship mines and land-based aircraft but also space-based reconnaissance and communications assets, unmanned aerial platforms and extended-range ballistic and anti-ship cruise missiles. Such raids would likely focus on strategic cargo ships (e.g., oil supertankers) as they approach key predetermined maritime bottlenecks.

Applied on a larger scale, over the next decade or so it becomes possible to conceive of blockades against major ports and airfields by one power against another within a region. These blockades could be undertaken, for example, by China against Taiwan, Japan or Korea; by India against Pakistan; or by Iran with respect to maritime traffic attempting to exit or enter the Persian Gulf through the Strait of Hormuz.

### Irregular Warfare

Operations against irregular forces are likely to change substantially as a consequence of demographic trends and technology diffusion. The preponderance of such operations are conducted in the Third World, which in many areas is experiencing rapid population growth. It seems likely, therefore, that future operations will increasingly find US forces seeking to exercise control over urban terrain, to include megacities and areas of urban sprawl.

Furthermore, irregular forces will improve their capabilities and effectiveness as they bottom feed off advanced technology diffusion. For example, they may radically improve their ability to coordinate dispersed operations thanks to the diffusion of personal communications equipment such as cellular phones, email and faxes. They may possess chemical and biological weapons, which they may use to hold both US forces and the noncombatant population at risk. Advanced mines and man-portable, anti-aircraft missiles could threaten US force mobility. Together, the effect of these trends will be to exploit enduring US military weaknesses by creating a competitive environment requiring manpower-intensive operations over a protracted period with the prospect of incurring substantial casualties.

### Urban Eviction

Urban defense may also be a fallback strategy of enemy regular forces if the United States military develops the ability to project power in the absence of forward base access. As the Gulf War and Operation Allied Force demonstrated, enemy ground forces are no match for the US military when fighting concentrated and in the open. Consequently, they now have an enormous incentive to disperse and to position themselves in so-called complex terrain, such as mountains, jungles or urban environment. Urban control and eviction operations would dilute the American military's competitive advantage in technology, while exploiting the United States' alleged aversion to manpower-intensive operations and their risk of higher casualties. Thus, urban control and urban eviction-capable forces could be an increasingly desirable characteristic of US military allies.

## Homeland Defense

The proliferation of ballistic and cruise missile technology, combined with the concentration of great destructive power (i.e., chemical and biological agents) in the hands of small groups and individuals will place the US homeland at increasing risk of major attack. The challenge will be heightened further by the relatively high uncertainty surrounding the national information infrastructure's vulnerability to electronic attack (i.e., information warfare).

While America's geographic position is a source of enduring advantage, at the same time it is a source of potential weakness as well. The United States' long, relatively open borders and an extended coastline will continue to make defending against both missile (especially cruise missile) and nontraditional attacks on the homeland (e.g., narco trafficking, irregular force WMD employment) a challenging proposition. The homeland defense problem may be further complicated by the US political system, which places high value on individual liberties, thus making it more difficult to identify groups planning covert attacks, and on a federal government structure, which may make coordinating any defense more problematic.

Of perhaps even greater concern, the United States could also witness the rise of ambiguous attacks on the homeland, manifested in one of three ways. First, broad-based, no fingerprint electronic attacks (e.g., computer viruses) could be mounted against our information infrastructure by another state or group. The attacker might even disperse his electronic strike force to other countries before executing his attacks. Second, an attacker could coordinate the infiltration of irregular forces carrying chemical or biological agents into the US homeland. Strategic strikes could then originate from *within* the US homeland. Third, to the extent that space architectures become a critical component of a state's military capability and economic viability, it is possible to envision nonlethal strategic-strike operations being conducted in space. Although the risks for an attacker in conducting these sorts of strategic strikes may be considerably less than more direct forms of attack, it is not clear that, even under these circumstances, states will want to run even a slight risk of retaliation. Ironically, this could leave the strategic-strike field dominated by non-state actors.



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### III. BEYOND THE QDR

#### THE STRATEGY-PROGRAM DISCONNECT

The current security environment presents challenges that are substantially different from those posed during the United States' long-term competition with the Soviet Union. The security environment that will likely emerge in the next decade or so promises to produce even greater changes in terms of the challenges to US interests. Unfortunately, sustaining America's current dominant military advantage is almost certain to prove more difficult over time, for at least two reasons. First, America's unipolar moment following the collapse of the Soviet Union is unlikely to endure. Great regional powers, like China and India, whose ability to generate military capability dwarfs that of the North Korea and Iraqs of the world, are on the rise. Other former super powers, like Russia, may recover to great regional power status. While the United States should not assume any of these powers (or a coalition of powers) will become adversaries, history indicates that great powers do compete, and that maintaining highly favorable military balances can help avoid conflict. Furthermore, great regional powers will also benefit from the emerging military revolution. In some instances, this may enable them to develop capabilities that would rapidly devalue current dominant US military systems and forms of operation.

These growing and emerging challenges that seem very likely to characterize future conflicts have already been elaborated upon and need not be restated here. Suffice it to say that transformation implies setting the defense program on a path that will enable the military to meet the challenges of a changing conflict environment. At the same time, however, any strategy must also preserve the US military's ability to defend America's global interests throughout the entire transformation period, which could run a decade or longer. Taken from this perspective, it is a challenge that is unprecedented in our military's history.

Moreover, transformation is also about developing the new capabilities and forms of operations that will enable our military to preserve its current advantages during this military revolution. The US military has an opportunity—indeed, an *imperative*—to exploit the potential of, among other things, extended-range precision strikes; distributed, nonlinear ground operations; highly integrated and widely dispersed fleet operations; unmanned systems and operations; space and cyberspace operations; and new forms of strategic strike. In fact, “transformation” has been advocated across-the-board—by the Secretary of Defense, the Joint Chiefs of Staff and congressionally-mandated blue ribbon panels. To sum up, the challenges to US military dominance will almost certainly increase in scale, and change substantially in form; hence the need—but also, given an emerging military revolution, the *opportunity*—to transform the American military.

Yet this support is most honored in the breach. The current defense posture, as developed in the Defense Department's 1997 Quadrennial Defense Review invests far too much time, money and forces in preparing for familiar, near-term (indeed, one might say bygone) challenges. While great geopolitical and military-technical changes have occurred over the past 12 years, today's military very much resembles that which existed in 1988. Despite the collapse of the Soviet Union, the shift in geopolitical focus from Europe toward East Asia, a decade of contingency

peacekeeping operations policing democracy's empire, and the confirmation of stealth, precision and satellites as agents of military transformation, the US military today most resembles a smaller, but all-too-similar, version of its late-Cold War self.

To some extent, this is understandable. After all, it takes time to effect large-scale change in big organizations, and the American military is no exception. Yet is difficult to believe that a smaller, yet essentially similar, military to that which won the Cold War and the Gulf War is the optimum military to meet today's security challenges, let alone the very different kinds of threats that are now perched on the horizon.

What is even more remarkable is that the current defense program places its primary emphasis on modernizing the force in such a way as to field a military whose capabilities are overly oriented on dealing with rapidly fading threats to our security, while according too little emphasis to preparing for growing and emerging challenges.

The current defense program focuses much of its efforts on creating and sustaining forces that are ready and capable of waging large-scale warfare in two separate theaters in overlapping time frames. This two-Major Theater War posture that drives a good portion of US readiness and force structure requirements is an artifact of the Persian Gulf War. Yet this war's character, as General Colin Powell has noted, was more reflective of the Cold War battle the US military had prepared to fight in Europe for nearly 40 years than of the future character of warfare.

The two-MTW posture—its origins resting in debates over Desert Storm-equivalent force building blocks oriented on the Persian Gulf and the Korean Peninsula—is an increasingly poor metric by which to gauge the effectiveness of our defense strategy and program. Today's Iraqi threat is far smaller in scale than that posed in 1991. The Republican Guard is but a pale shadow of the force that existed then. As for Iran and North Korea, the threats they pose are centered more around embryonic anti-access/area-denial capabilities than on attempts to create their version of a large, Republican Guard-like, mechanized, heavy land force. In short, the kind, or *form*, of the challenge presented by these rogue states is different from the threat posed by Iraq during the Gulf War. Thus even the Defense Department's emphasis on minimizing the near-term risks to America's security is being accomplished in a relatively ineffective manner.

At its core, the two-MTW posture must be about more than defeating today's rogue nations. It must address the US military's long-term ability to project power over great distances, for prolonged periods of time, on a scale sufficient to defeat a major regional power. With the rise of anti-access/area-denial capabilities, the proliferation of weapons of mass destruction, the empowerment of small groups as they gain access to WMD and tap the potential of information warfare, as well as the rise of ad hoc coalitions, the conflict environment in which the United States military must be able to project power will likely change dramatically. Indeed, it is already changing. A US defense posture that fails to take these kinds of changes into account will almost certainly experience erosion in the effectiveness of its military capabilities.

## THE PLANS-FUNDING MISMATCH

Over the long term, the cost of the plan outlined in the 1997 QDR is likely to exceed substantially the level of funding currently projected for defense. Under the Clinton Administration's February 2000 Future Years Defense Program just over \$300 billion (FY 2001 dollars) a year would be provided for defense through FY 2005, the last year included in the plan.<sup>1</sup> This is roughly the same level of funding that has been provided over the past eight years. It is also essentially the same level of funding projected for defense through FY 2005 in the most recent Congressional Budget Resolution (CBR). We estimate that this is probably some \$60 billion less than would actually be needed to pay for the administration's defense plan over the next five years (FY 2001–05).

Over the longer term, we estimate that to support the QDR defense posture, annual defense budgets would have to be increased even more substantially. Specifically, we estimate that in the *ten years following* the FYDP, an average of about \$345 billion a year would be needed to cover the cost of the current plan. This is some \$40 billion a year more than projected in either the February 2000 FYDP or last year's CBR. In other words, over the long term, funding for defense will likely have to be increased by at least \$40 billion annually if the 1997 QDR's force structure, modernization and readiness goals are to be achieved and sustained.

There are a number of reasons why the cost of the current defense plan is likely to grow substantially over the next five years, and especially over the next 15 years. These reasons include:

- the projected entrance into production of a broad range of new weapon systems, such as the F-22, F/A-18E/F, Joint Strike Fighter, New Attack Submarine (NSSN), DD-21 surface combatant, and Comanche helicopter;
- the fact that many of these new weapon systems will cost twice as much or more to procure than the systems they are replacing; and
- the likelihood that, as has been true historically, DoD's operations and support (O&S) costs—including military personnel pay, operations and maintenance (O&M) activities, military construction, and family housing—will prove to be significantly higher than currently anticipated.

The existence (or lack) of a plans-funding mismatch tells us nothing about how wisely the Department of Defense is spending its money, or whether the mismatch is caused by overly ambitious plans or too little money, or whether the country has the right national security strategy. Moreover, mismatches of this magnitude or larger are very much the norm for the Defense Department. What the existence of such a mismatch does show is that there is a

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<sup>1</sup> This \$300 billion includes an average of about \$14 billion a year for Department of Energy and other non-DoD defense activities. This funding is not technically included in the FYDP, which is a DoD document, but is included in the National Defense budget function.

disconnect between plans and resources that will eventually have to be resolved. The estimate of the size of that mismatch provides a rough indication of the amount by which plans will have to be scaled back, or how much money will have to be added. The existence of a mismatch also often leads to inefficiencies. For example, based on overly optimistic assumptions about cost growth and funding levels, DoD's plans often envision a rate of production for new weapon systems that is higher than can ultimately be supported—resulting in the creation of production facilities and a workforce that operate below their most efficient production rate.

## THE FY 2002–07 PLANS-FUNDING MISMATCH

The new administration will focus its planning and budgeting decisions on the FY 2002 request, and the FY 2002–07 period, the years that will be covered by DoD's next FYDP. It is of course impossible to tell whether, let alone estimate by how much, this FYDP will be overprogrammed or underfunded until it is submitted by the new administration. However, if funding for defense remains on the same—in real terms, essentially flat—trajectory through FY 2007 that it is currently projected to remain on in both the 2000 Clinton plan and the 2000 CBR through *FY 2005*, and if no major reductions in force structure, modernization or readiness are proposed, a reasonable estimate of the mismatch over the FY 2002–07 period would be about \$120 billion (compared to \$60 billion over the FY 2001–05 period, and some \$40 billion *a year* after FY 2007).

Prior to leaving office, president Clinton reportedly intends to submit his own revised defense plan for FY 2002–07, which would include an addition of some \$50 billion over this period.<sup>2</sup> If this latest proposal, rather than the Clinton Administration's February 2000 defense plan, were used as the baseline, the plans-funding mismatch would decline to closer to \$70 billion over the FY 2002–07 FYDP.

## TRANSFORMATION AND THE PLANS-FUNDING MISMATCH

As discussed in more detail later in this report, the existence of a substantial plans-funding mismatch creates an added burden for efforts to fund even a modest set of transformation initiatives. However, it is important to distinguish between the two issues. The existing mismatch will have to be resolved—by adding more money or scaling back programs—whether or not any new transformation initiatives are pursued. More importantly, the case for transformation may actually be strengthened to the extent that current plans appear to be unaffordable within projected budgets. If the current plan is not sustainable within the future defense budget levels likely to be supported by either major political party, then the only way to meet US security requirements in the future may be to adopt a very different way of meeting future military challenges—i.e., to transform the US military. At a minimum, these affordability questions would seem to bolster the case for investing a modest amount of resources to explore and

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<sup>2</sup> Greg Jaffe and Anne Marie Squeo, "Bush's New Weapons Will Force Cuts In Older Programs," *Wall Street Journal*, January 11, 2001, p. A24.

experiment with various new technologies, concepts of operation and organizations that show promise for achieving dramatic improvements in military effectiveness.



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## IV. TRANSFORMATION STRATEGY

Defense strategy in peacetime is affected not only by interests and potential threats to those interests but also by the state of military capabilities and whether core capabilities are likely to change incrementally or discontinuously during the time horizon covered by strategy. Transformation strategy encompasses plans and actions which have the aim of inducing, sustaining and exploiting revolutionary change in military capabilities and the conduct of war.

Strategies for transforming the US military are the heart of our defense program. The remainder of this paper outlines strategies to transform our air and space forces, naval forces, land forces, homeland defense forces, strategic forces, and our alliances and network of overseas bases. In this section, we discuss our defense-wide approach to transformation. The intent here is to outline a strategy for transformation from the perspective of the next secretary of defense. Since the process of transformation is likely to be similar within the individual Services, however, the general approach described below is applicable to them as well.

### THE NEED FOR AN ANTICIPATORY, DEFENSE-WIDE STRATEGY

There are several reasons why a defense-wide approach to transformation is needed. While we recognize that the Services are, and will remain, the sources of warfighting expertise within their respective domains, the direction of defense policy is set by the secretary of defense. Decisions made by the secretary and his top level advisors regarding the allocation of resources and the selection of senior leaders will significantly shape transformation efforts, for better or worse. To varying degrees, moreover, the transformation of individual Services is dependent in fundamental ways on supporting change within other Services (for example, far greater ground-force reliance in the future on remote fires and strategic mobility provided by other Services). The Services are also likely to differ from one another with respect to the pace and scope at which they pursue the transition to a new force posture. Significant change in the relative capabilities of the Services as they transform differentially has important ramifications for long-term defense strategy—affecting, for example, the kinds of military options the National Command Authority would have at its disposal at a given time.

There are operational reasons that argue for a centralized approach as well. The key advances in military capability underwriting the revolution in warfare—in awareness, connectivity, range, endurance, precision, miniaturization, speed, stealth, automation, and simulation—affect the core operations of each of the Services and will increasingly allow them to crowd into each other's battlespace. Future warfare is likely to be far more integrated than warfare is today, and the core drivers of transformation—the challenge of projecting power in an anti-access environment (including into large, urban areas), ensuring space and information superiority and defending the American homeland against new threats—are fundamentally joint and interagency problems.

Transformation strategies can either be anticipatory (e.g., those initiated before they are mandated by a competitor's actions) or reactive (those initiated in response to disequilibrating change by a competitor). Ours is anticipatory for several reasons. Although the United States stands to benefit enormously from the emerging revolution in warfare, certain aspects of this

change (e.g., the likely increasing strategic effectiveness of missile-based, long-range, precision-strike capabilities) could significantly advantage our potential competitors. There is substantial evidence, moreover, that potential competitors are aware of the ways in which ongoing trends could alter strategic balances in their favor. Unfortunately, the US ability to forestall potential adversaries' exploitation of this revolution will likely be quite limited. Some of the key capabilities—ballistic and cruise missile technology, for example—are well understood and are accessible by potential adversaries. Others, such as rudimentary stealth, are likely to follow, perhaps within this decade. The dual-use nature of some capabilities (e.g., commercial space launch services) will exacerbate the US efforts to maintain existing advantages, as will the increasing military value of commercial and non-defense scientific capabilities (e.g., space-based imaging, navigation and communications, information technology, and biotechnology). Future competitors, in all likelihood, will be much stronger economically than these rogue states we face today, so it will be more difficult for the United States to buy its way out of its mistakes.

The most important reason for pursuing an anticipatory strategy, however, is that failure to move through periods of revolutionary change in warfare ahead of potential competitors has historically been far more costly to the strategic position of leading powers. When a leading power (the British Navy, for example, at the turn of the twentieth century) is the first to make the leap to a new way of war, the result has usually been at worst a continuation of the strategic status quo. Conversely, when a would-be challenger (e.g., the Prussian Army during the mid-nineteenth century) has been the first to make the leap, transformations of war have typically led to dramatic shifts in power balances. Thus while the United States is currently preeminent in the world militarily, its future superiority is not guaranteed.

Transforming its military capabilities in advance of potential rivals could allow the United States to shape the emerging competition in important ways. If the United States transforms its military capabilities and its potential adversaries do not, the United States could enjoy a historically rare, revolutionary advantage, substantially enhancing the deterrent power of US forces and helping to ensure a long peace. Even if America does not secure a long-term monopoly on the emerging military revolution, early adoption of new capabilities may block or reduce the strategic gains available to potential competitors by making ourselves and our allies much less vulnerable to emerging threats. A transformation of the US air, land, sea, space, and information forces, moreover, would complicate potential adversaries' strategic planning efforts considerably.

## THE CORE ELEMENTS OF TRANSFORMATION

Our broad approach to transformation combines six elements:

- a future warfare vision that will impart direction to transformation efforts;
- selection of senior leaders based on their ability to effect transformational change;
- robust funding for leap-ahead technologies and sustained experimentation;
- creation of the organizational slack necessary for innovation and institutional reform of the Department of Defense, the armed forces and the defense industrial base;



- a procurement strategy in the near- to mid-term that emphasizes limited production runs of a wide range of new systems and extensions and upgrades of existing systems; and
- divestment strategies to eliminate capabilities that are a poor fit with the emerging strategic environment and to free up resources to finance transformation.

Transformation of military capabilities is frequently a lengthy process. Indeed, it is almost certain that the full effects of the transformation strategies we propose here will not be realized until after 2020. While important new capabilities can be added to make our armed forces more strategically robust in the near to mid-term, most of the coming decade will be focused on posturing the US military for full transformation, with large-scale replacement of existing force structure not likely until well after 2010.

Transformation must begin immediately, both because it is a lengthy process and to mitigate a potential national security “train wreck” in the not-too-distant future. The necessary first step on the path to transforming the US military is the development of a vision of future warfare that will impart needed direction to the transformation effort. Current joint and Service visions are either not precise enough to provide clear guidance (e.g., Joint Vision 2020), do not address the likely full range of emerging challenges (e.g., Army transformation, Navy Network-Centric Warfare), or are extensions of the current status quo (e.g., air-space integration).

## THE FUNDAMENTAL IMPORTANCE OF VISION AND LEADERSHIP

A new “Defense Vision 2025” is needed to set priorities for DoD investment and activity and to focus the Department on key emerging challenges, capabilities and their implications. Among the key emerging challenges that should be addressed from a defense-wide perspective are power projection in an anti-access/area-denial environment, urban eviction and control (particularly, but not limited to, the challenge of urban warfare in an anti-access environment), space and information control, and homeland defense. Among the emerging capabilities that should be included in the defense vision are greater anticipated reliance on unmanned systems and information-intensive, network-based forces. The implications the vision might draw from its discussion of these emerging threats and capabilities range from the likely need for extended-range power projection with smaller, stealthier forces, to the increased importance of undersea warfare. Such a vision would not only focus transformation efforts on technology development and experimentation, it would also lay the groundwork for Service-specific visions (e.g., of an air force that fully exploits the potential of unmanned warfare, projects power in the absence of forward bases, and projects decisive force into, from or through space).

Developing and implementing such a discontinuous vision of future warfare will not be an easy task, hence the critical importance of leadership. Transformation is first and foremost a key responsibility of the secretary and deputy secretary of defense. Both must be completely committed to transformation and must have strong political backing from the White House. Transformation will require the secretary and deputy secretary to be tough minded activists. Since transformation will likely create more losers than it does winners in the near and mid-term (e.g., reductions in force structure and cancellation of major weapons programs vice broader

technology development and limited procurement runs), they must likewise build political support for their efforts with the Services, Congress and the defense industry.

Primary transformation areas that fall under the secretary and deputy secretary's direct purview include redirection of defense investment, senior officer selection, supervision of transformation experiments to ensure that appropriate performance metrics are being used, imparting technological momentum for fledgling, but promising, programs (e.g., such as unmanned aerial vehicles that must compete for budgetary share within a competitive reconnaissance-strike architecture, to include both space systems and manned aircraft), institutional reform to include reform of the military education system, and of course, political strategy. Because transformation efforts cut across jurisdictional lines within Office of the Secretary of Defense (e.g., across the under secretaries for acquisition and technology, policy, personnel and readiness, and the comptroller), consideration should be given to creating a transformation czar who would have authority across these lines and report directly to the secretary and deputy secretary. Transformation, however, must remain a responsibility of the Secretary of Defense and the deputy Secretary of Defense; such a czar would function more as a coordinating and monitoring "assistant for transformation" than as a direct decision authority.<sup>3</sup>

The role of Service secretaries has been diminished since the passage of the 1986 Goldwater-Nichols Act, but they and their civilian deputies are essential to transformation. They are more directly accountable to the secretary of defense and can affect the promotion system at lower levels. Accordingly, strong activists who share the secretary's vision should be selected for these positions and for key positions within the Office of the Secretary of Defense as well.

A critical mass of senior military leaders must likewise be established to induce and sustain transformation. The ability to effect transformation consistent with the secretary's vision should be a central criterion for selection as JCS chairman, JCS vice chairman, Service chief, or vice Service chief. (Whether the current incumbents possess the necessary attributes to implement the secretary's vision is a key transition issue. If warranted, early placement of key military leaders would send a strong signal that transformation is a top priority.) Additionally, while great transformational leaders can originate from legacy warfare specialties, consideration should also be given to selecting individuals for these positions from within communities likely to be congruent with the secretary's future warfare vision. This might mean, for example, choosing a submariner as chief of naval operations, a bomber pilot or space warrior as chief of staff of the Air Force, or a light infantryman or special operator as Army chief of staff.

Sustaining transformation will require significant senior involvement in the flag officer promotion system to ensure that follow-on transformational leaders make their way into key positions. Given the short tenure of most senior leaders, consideration should also be given to retaining selected senior military officers who prove important to sustaining transformation in their current positions for two, or even three, consecutive tours.

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<sup>3</sup> Developing a list of key transformation positions inside and outside of the Defense Department should be a priority transition issue.

## LEAP-AHEAD TECHNOLOGY AND EXPERIMENTATION

In the area of defense resources, transformation will likely require a sustained, R&D-intensive strategy. Such a strategy would shift resources away from current force structure and incremental modernization and into research and development, experimentation and leap-ahead procurement.<sup>4</sup> A key purpose of the defense R&D program is to create a portfolio of real options for future decision-makers and to hedge against uncertainty.

Research, development, testing and evaluation (RDT&E) funding is currently projected to decline by some 15 percent in real terms over the next several years. Such deep reductions must be avoided, and R&D efforts refocused to support development of capabilities that will be in demand in ten to twenty years. This will require significant increases to the S&T accounts—in excess of ten billion dollars—over the Future Years Defense Program. Defense R&D must also seek to leverage the transformation that has taken place in national R&D funding. Three decades ago, defense R&D was approximately double that of civilian R&D; today private sector R&D outstrips defense investment by a factor of five. Areas of civilian technological strength that the Defense Department could potentially leverage include commercial space systems, information and communications technologies and biotechnologies.

The additional resources devoted to R&D would fund robust exploration of myriad potential leap-ahead technologies that offer promise in addressing such emerging challenges as projecting power in an anti-access environment, controlling space and defending the American homeland against new threats. Among these are technologies supporting:

- distributed satellite constellations, space-based radars with moving target indicator (MTI) capability, foliage penetration radars, and see-through-wall radars;
- broadband, network-based warfare;
- unmanned aerial, ground and undersea vehicles, micro-robots and micro-UAVs, performance-enhancing exoskeletons,<sup>5</sup> and missiles in a box—expendable pods of missiles that can be fired remotely;
- next generation stealth for air mobility aircraft, surface ships and ground combat systems;
- extended-range electronic warfare, to include false-target generation technologies and other active information protection technologies;

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<sup>4</sup> “Leap-ahead,” as used in a transformation context, means capabilities that are compatible with an emerging military regime. Advances within an existing warfare regime, no matter how revolutionary—e.g., a stealth fighter that relies on forward-base access—will usually fail to meet this test.

<sup>5</sup> A performance-enhancing exoskeleton incorporates robotics and other technologies to significantly enhance the mobility, lethality and survivability of the individual soldier. The Defense Advanced Research Projects Agency has recently begun a multi-year technology development program in this area.

- enhanced, undersea-based power projection for responsive, large-scale strike and amphibious delivery (e.g., by employing SSGNs);
- hypersonics, directed energy and electromagnetic gun systems;
- new power sources (e.g., fuel cells) to reduce the logistical footprint of US forces;
- space control, such as micro-proximity satellites that can temporarily or permanently impede the function of enemy space systems;
- computer network attack and defense technologies; and
- advanced biological warfare defenses (e.g., sensors and vaccines), and materials and compounds for bio-enhanced operations.

In conjunction with an expanded and redirected defense technology strategy, much greater emphasis must be placed on Service and joint experimentation. Transformation exercises and other forms of military experimentation offer an important means for identifying the operational concepts, capabilities and force structures that will be required to deal with emerging threats.

The budget for experimentation must be increased dramatically—by several billion dollars over the Future Years Defense Program. Forces and prototypes of emerging systems in operationally significant quantities must be made available to conduct experiments. Equally important, experimentation must be refocused on emerging challenges to US security. Current joint experimentation is too narrowly focused on near-term remedies for joint operational deficiencies (i.e., improving existing methods of war rather than transforming them).

To facilitate this experimentation, two new training facilities should be created. The first, a Joint Anti-Access/Area-Denial National Training Center, should be established adjacent to a littoral area so that maritime, air and ground forces can operate together and competitive capability experiments can be assessed. The second, a Joint Urban Warfare Center large enough to allow the exploration of operational-level urban warfare concepts, should be established.

Since our adversaries will likely pursue the military revolution asymmetrically, there may also be a need to create standing joint opposing forces (JOF) for US transformation exercises. The joint opposing force would likely comprise a few thousand service men and women. Such a force, under the command of the commander in chief (CINC), Joint Forces Command, could be equipped with likely anti-access/area-denial capabilities, both real and simulated (e.g., simulated mobile launchers and long-range missiles). Among the opposing force capabilities would be those involving distributed, extended-range, precision-defense, urban-warfare, anti-navy, information, and space denial operations. Some capabilities might be leased rather than purchased outright (e.g., Sweden's low observable surface combatant, the *Visby*, or air-independent propulsion diesel attack submarines).

Consideration should also be given to establishing an independent funding line for CINC, Joint Forces Command to fund the development of exploratory systems that fail to find support within

the Services. Similarly, US special operations forces may represent a valuable laboratory for prototyping many emerging capabilities. They will likely make the most extensive early use of robotics and will likely have the earliest need for stealthy airlift and large-scale (e.g., employing SSGNs) undersea delivery.

The results of transformation exercises and experiments must find their way back into the defense requirements process. (An additional, though less certain, source of feedback for transformation efforts are “precursor wars”—wars, typically against smaller powers, that provide a proving ground for new systems and concepts.) In the coming decade, experimentation should be used to inform the defense R&D program, evaluate prototype systems and explore new operational and organizational concepts—both transitional and transformational. The likelihood of revolutionary innovation might be enhanced substantially by encouraging a more competitive approach to joint operations.<sup>6</sup>

During the transition to a new force posture, experimentation would be used principally to refine emerging operational and organizational concepts and to identify those systems and capabilities that will be required in the new force posture. Systems choice problems arise in the evaluation of competing capabilities within a complex systems environment. These decisions are particularly difficult during periods of transformational change.<sup>7</sup> New decision aids (e.g., models and simulation tools) will be required to facilitate a large-scale transition to a new force posture.

## ORGANIZATIONAL SLACK AND INSTITUTIONAL CHANGE

Organizational slack must also be created if innovation is to flourish. Freeing up the necessary human resources will require critical looks at our current approaches to overseas presence, the forces we allocate to existing war plans and our system of higher military education. For example, naval forward presence might be conducted more routinely with surface action groups and SSGNs, in lieu of carrier battle groups. Major theater war plans might emphasize long-range air assets, sea-launched missiles and distributed, early-entry ground forces. Additional intellectual capital could be brought to bear on transformation by reorienting the higher military education system (staff and war colleges) toward emerging challenges and by expanding the number of staff positions that focus on future warfare.

Developing revolutionary capabilities will require a corresponding transformation of the US defense industrial base. During the 1990s, the defense industrial structure has become increasingly concentrated and less competitive. New policies to increase competition, and with it, the likelihood of innovation, are essential. These could range from restoring profitability to independently-performed R&D and bolstering the profitability of the development phase of competitive R&D, to greater openness to trans-Atlantic defense cooperation and competition.

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<sup>6</sup> A competitive approach to joint operations would allow alternative concepts to compete for incorporation into a regional CINC’s war plans and resource requirements.

<sup>7</sup> In the course of the ongoing transformation of war, systems choice problems could arise from competing approaches to C4ISR, long-range precision strike, strategic mobility, maneuver, and close combat and dimensional control.

As transformation progresses, institutional change will also be required within DoD and the armed forces. This could encompass the creation of new Services (e.g., the creation of a Space Force), new career paths to facilitate new warfare specialties (e.g., unmanned warfare specialists), a new professional corps (e.g., a joint general staff), and/or new institutions for professional military education (e.g., a joint advanced warfighting school).

## A NEW APPROACH TO PROCUREMENT

In the near- to mid-term, a new approach to force modernization will be needed. At present, the US modernization program follows a buying-in-bulk, long-production run approach that limits opportunities to keep pace with rapidly advancing technologies and to procure a wider range of military systems. While there is an increasing need to recapitalize the force after the procurement holiday of the 1990s, many systems currently in production or planned offer a questionable fit with the emerging strategic environment. With respect to new systems, the Defense Department must shift toward much shorter production runs of new systems, coupled with the production of a wider range of systems to maximize the opportunities for innovation until uncertainty about which systems will be needed in the 2015–25 time frame, and the technological flux associated with many of these systems, have been substantially reduced. Where force structure concerns mandate earlier recapitalization (e.g., in attack submarines and tactical aircraft), service-life extensions and upgrades to existing systems should be pursued to the maximum extent feasible (e.g., refueling Los Angeles-class submarines, procuring Block 60 F-16s, and perhaps additional F-15Es). In these cases (and perhaps with respect to a very few leap-ahead systems such as Trident conversion and additional B-2 bombers), systems should be procured in economically efficient quantities.

## DIVESTMENT AND THE NEW ECONOMICS OF DEFENSE

Transformation requires a divestment strategy, irrespective of the size of the defense top line. Divestment of current force structure and modernization systems should be undertaken for any of the following reasons: to finance transformation and to shift security risk from the long to near term (where, arguably, it can more easily be borne); to retire or forego near-term capabilities that are a poor fit with the emerging strategic environment, or which are excessive or redundant; or to swap legacy capabilities for transformational ones.

Transformation will fundamentally alter our notions about the economics of national defense and the relative cost-effectiveness of military capabilities. For example, over time, investment in some program categories, such as strategic air mobility (due to the application of stealth and the likely necessity for a large air fleet) and space, could rise substantially. Other capabilities, such as greater reliance on unmanned aircraft and lighter, smaller ground forces and decreased dependence on carrier battle groups as the basis for naval power projection, could result in substantially lower defense costs. Similarly, over the longer term, costs per soldier in some units could rise substantially, due, for example, to the provision of performance-enhancing exoskeletons. But, the number of exoskeleton-equipped soldiers within a ground force could remain relatively small.

## THE US FORCE POSTURE IN 2025

By 2025, the US force posture could be fundamentally transformed. More than half of combat aircraft in the US Air Force could be unmanned, and much of the force (including some air mobility aircraft) could exploit signature reduction technologies to evade detection. An Air Force that invested in extended-range capabilities might be able to gain and maintain air superiority and strike a wide range of mobile and fixed targets without access to vulnerable in-theater bases. Such an Air Force (or a new Space Force) could have capabilities to control space and to strike rapidly from or through space. A future US Navy might have robust capabilities for stealthy surface warfare and undersea-based power projection. Missiles in this future Navy might replace aircraft as the principal basis for naval strike. Future US ground forces may make heavy use of robotics, stealth and information protection. Stealthy, lightweight, advanced combat vehicles could replace the heavy main battle tanks of today. The central role in this future Army could be played by an infantry and special operations-centered force. The US homeland could be far better defended against the threats of missile attack, biological agents and electronic strike. But for any of this to happen, transformation needs to begin in earnest now.





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## V. READY NOW—AND READY LATER

With defense budgets unlikely to increase significantly, some small increase in near-term risk will have to be taken on if we are to improve substantially our ability to reduce long-term risk and sustain our current margin of military superiority. Fortunately, the current two-war posture provides opportunities to liberate resources for transformation while taking on only modest risk to our security in the near term. Moreover, by initiating transformation now the US military will be able to reduce substantially the longer term security risks to the nation, when the danger is likely to be far greater than it is today.

### MILITARY READINESS: READY FOR WHAT?

Traditionally, the term “military readiness” has most often referred to the readiness of the military to fight or carry out other real world operations on relatively short notice. But the term has been broadened by some to include the long-term readiness of the US military to confront future challenges as well. Even using this first, relatively narrow, definition of readiness, it is difficult to gauge just how ready the US military is today. Among other things, this is because many of the major indicators used to track readiness are widely viewed as flawed. That being said, the best available evidence seems to suggest that pockets of unreadiness exist—as reflected, for example, in declining mission-capable rates for Air Force aircraft and continuing challenges with recruitment and, especially, retention. To be sure, these shortcomings need to be addressed; however, overall, the near-term readiness of the US military remains relatively high.

Ultimately, the best way to judge the US military’s current readiness may be by its performance in recent military operations in Southwest Asia, Bosnia and Kosovo. Overall, the US military has performed very well in these operations. In Kosovo, for example, the US Air Force and Navy flew over 20,000 sorties, while losing just two aircraft to enemy action. This attrition rate was even lower than that sustained during the 1991 Gulf War.

Judged in broader terms and from a longer-term perspective, however, the current readiness of the US military is less reassuring. Over the past eight years, both the administration and Congress have placed the highest priority on maintaining near-term readiness. Repeatedly over this period, operations and support costs have run higher than anticipated, and funding projected for weapons procurement in earlier plans has had to be shifted into the O&S accounts. This trend is likely to continue in the future. This means that unless the topline for defense is increased substantially—which, as discussed elsewhere in this report, seems improbable—the growth in procurement funding projected in the current plan is unlikely to materialize. And over the long run, flat or declining procurement budgets would be insufficient to adequately equip the 1.37 million-troop force structure currently envisioned, even assuming a slower approach to modernization were taken. On the other hand, if funding is not shifted into the O&S accounts, near-term readiness levels could drop significantly over the coming decade.

More importantly, the fact that today’s military appears to be ready in the traditional, narrow, near-term sense of the term, tells nothing about whether it is ready for the right kinds of missions and challenges. We want a military that is both ready for today’s threats, and preparing to meet

those emerging threats gathering on the horizon, not a force that is organized, trained, equipped, and prepared to fight and win yesterday's battles. Viewed from this perspective, the readiness picture is far less encouraging.

For example, concerns have been raised recently over the readiness levels of Army divisions, two of which were rated C4 (not ready to fulfill their wartime missions) last fall. But what are the Army's wartime missions? Last spring the military was called upon to quickly deploy an Army ground force to the Albanian border with Kosovo and was unable to do so. In this case, the readiness metrics (e.g., percentage of authorized personnel; percentage of equipment in combat-ready condition; numbers of hours spent in training, etc.) were irrelevant. Even if all the Army's divisions been at full strength and rated "fully ready," not one could have deployed quickly to the border. Army leaders are now struggling to transform their divisions so they can be deployed rapidly, and thus be more strategically relevant, to use the Pentagon parlance. Unfortunately, this will likely take years, and the Army has yet to identify how it will fund its transformation.

By hewing too closely to Cold War era readiness metrics, we risk being far more ready for the last war than to deter or win the next war. For example, we have built, and are continuing to build, a military that will be ready to deploy massive combat power to (and through) forward bases in times of crisis or war, much as we did during our long struggle with the Soviet Union. It is the foundation of the Defense Department's Two-War standard. Yet a string of blue ribbon defense panels have warned that, as ballistic and cruise missile technology diffuses, absent fantastic progress on missile defenses, more and more militaries will be able to hold these bases at high risk of destruction.

To be sure, there are worrisome pockets of unreadiness in today's military that must be addressed. However, the most serious flaw with the US military today is not its readiness but its strategy. America's armed forces find themselves struggling to maintain readiness for increasingly unlikely contingencies.

## REFOCUSING AND REBALANCING THE STRATEGIC IMPERATIVES

What is to be done? Employing the vernacular of the QDR, the United States military should place greater emphasis on *shaping* the future military balances in regions that are vital to US interests, to *responding* to immediate regional threats that look increasingly different from the Gulf War, and to *preparing* to meet a range of security challenges that will require a very different kind of military than America fielded during the Cold War, the Gulf War or that it fields today.

How is this to be done? To begin, military readiness must be improved. Tomorrow's military cannot be built on the assumption that the readiness of today's force will be permitted to continue to erode. Yet we calculate that projected funding for the readiness accounts—for operations, maintenance and personnel—is not likely to be sufficient to preserve readiness at current levels. These funding accounts will have to be increased on a per capita (i.e., per soldier) basis. More importantly, the force must begin to transform itself so that its readiness can be

sustained—indeed, enhanced—in the face of the very different kinds of threats that are likely to emerge over the next decade. It is to this larger question that we now turn our attention.



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## VI. TRANSFORMING THE ARMY

### THE CHALLENGE

The Army finds itself challenged in the near term principally by the requirement to maintain forces sufficient to support the QDR's two-war posture and to conduct peacekeeping operations. The Service also finds itself challenged to become more of a rapidly deployable land 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 six of its ten active divisions are comprised of heavy, mechanized formations. These 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 disconnect between the need to deploy ground forces rapidly, Army heavy formations' limits on strategic airlift and forward bases austerity was highlighted during the Kosovo war in the spring of 1999. During that conflict, the Army struggled to position a ground force—Task Force Hawk—quickly on the Albania-Kosovo border.

The Army's inability to deploy quickly and sustain substantial ground combat power in that contingency has led some to challenge its strategic relevance. The Army is encountering increasingly stiff competition, particularly from the Air Force, over the early use of strategic airlift assets to facilitate rapid force deployment. Air power proponents argue that precision air strikes can substitute for much of the ground forces the Army provides. This is even more true, they assert, in contingencies where Army units are neither pre-positioned, nor capable of deploying quickly.

Such contingencies are increasingly seen as the rule and not the exception. While the Army's heavy mechanized forces possess the greatest combat capability, they are also extremely difficult to deploy rapidly. Deployment could be accelerated, at least in the short term, by increasing the Army's positioning of heavy equipment. Today the Army has seven heavy-brigade sets of equipment pre-positioned, two in Central Europe, and one each in Italy, Kuwait, Qatar, and South Korea, and one afloat. But this would likely prove only a short-term solution. The continued development of anti-access capabilities will likely make concentrations of pre-positioned equipment attractive targets for pre-emption by enemy cruise and ballistic missile forces. Buying the additional airlift required to deploy rapidly a major ground force (e.g., a two-division corps) would be prohibitively expensive.

Meanwhile, at the lower end of the conflict spectrum, some assert that the Marine Corps may be better suited than today's Army for rapidly deploying ground forces to minor trouble spots. In short, the Army has found its strategic relevance challenged. This has led the Service's leadership to propose a transformation of the Army. The objective of this transformation initiative is to develop the doctrine, equipment and force structures that will enable the Army to

respond rapidly and prevail decisively at any point along the conflict spectrum, from small-scale peacekeeping to major theater wars.

Field exercises are now underway to support this initiative. The exercises center on developing air-deployable, medium-weight brigades (MWBs). The goal is to begin fielding brigade combat teams (BCTs) by 2001, using existing combat vehicles. This “Interim Force” of BCTs, organized into divisions, will coexist with the remaining divisions of the Army’s “Legacy Force,” which will be modernized. At the same time, the Army plans to pursue the development of a Future Combat System family of systems. Among these systems is a successor to the Abrams tank that weighs roughly 75 percent less, but which retains a far greater share of the tank’s lethality and survivability. When the FCS is fielded, sometime in the next two decades, both the Interim Force and Legacy Force will adopt the FCS and merge into one “Objective Force.” The Army hopes to field an Interim Force that is capable of deploying a brigade to a forward base within 4 days, a division within 5 days, and five divisions within 30 days, while also retaining sufficient combat power to dominate across a wide range of missions.

Medium Weight Brigades, as currently conceived, may enable the Army to better address future Kosovo-like peacekeeping contingencies by deploying more rapidly to Third World trouble spots. Moreover, relative to heavy Army forces, these forces may well be able to operate more effectively in urban terrain, which promises to play an increasing role in future conflicts. Still, the medium-weight-brigade vision and the Interim Force is not without its problems. If the Army proves unable to square the circle of fielding rapidly deployable light forces that retain the combat potential typically associated with much heavier forces, it may yield a “Worst-of-Both-Worlds” force that still consumes substantial amounts of precious strategic lift, while lacking combat punch and sustainability.

There is yet another, far more serious, problem. The Army also finds itself in the midst of a military revolution. New threats are emerging for which the Army is not currently prepared or preparing. Potential adversaries are increasingly emphasizing the development of anti-access capabilities. Senior US military leaders have warned that, as adversaries acquire these capabilities, American military access to forward bases (and perhaps the littorals as well) will become increasingly problematic. It is far from clear that the medium-weight brigades will enable the Army to overcome this major challenge to its long-term, power-projection capabilities. Nor is such a force likely to enable the Army to exploit perhaps a great potential opportunity—ground formations capable of conducting joint, extended-range, precision-strike operations.

## THE RESPONSE

In fact, there are three principal requirements the Army must address to maintain its long-term strategic relevance, in addition to deploying rapidly in a relatively benign (e.g., peacekeeping) conflict environment. The future security environment will challenge the Army, as part of a joint force, to:

- 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. This also implies an

ability to conduct highly distributed, or dispersed operations, employing remote C4ISR systems to scarf the physical gaps between Army formations and extended-range fires to cover them.

- develop the ability to conduct control and eviction operations, against enemy irregular and regular forces, respectively, operating in restricted, or complex, terrain (i.e., especially in urban areas, but also in mountains and jungles).
- exploit the potential to conduct precision strikes at extended ranges.

While it may function as a useful transition force, it is not yet clear how either the Interim (or even the Objective) Force will address these emerging requirements. For example, a key measure of effectiveness of the Interim Force BCT is its ability to deploy rapidly through forward bases. Yet as the competitive environment is transformed, such bases are likely to be increasingly at risk from enemy cruise and ballistic missile attack. (Indeed, the Pentagon's own war games increasingly bear this out.) Arguably, one could conclude that the medium-weight force will essentially allow the Army to move its forces more quickly to the forward bases that form the focal point of the enemy's missile ambush.

Moreover, the medium-weight force, as currently conceived, does little to exploit the Army's potential to develop forces capable of massed precision deep fires. Such deep-strike formations, centered on extended-range reconnaissance (e.g., UAVs, sensors, light infantry, special operations forces (SOF), helicopters) and strike (e.g., missile artillery, attack helicopter, UCAV) elements, may represent for this military revolution what the panzer division did for blitzkrieg.

To be sure, the Army should proceed with its transformation efforts, but they should be modified to better address emerging threats, as well as existing requirements. The Army should proceed with its Future Combat System. Increased emphasis in procurement also should be given to capabilities that will enable the Army to see deep (e.g., UAVs, scout helicopters, remotely emplaced battlefield sensors, the development of long-range reconnaissance units, etc.); strike deep (e.g., attack helicopters, the HIMARS lightweight missile launcher, the ATACMS Block IIA missile, UCAVs); and coordinate large-scale operations employing highly dispersed formations on a nonlinear battlefield (e.g., digitizing the formations and linking them to the wider US military C4ISR architecture).

The Service's mobility requirements should be supported through research and development of an Advanced Technology Transport (ATT), Quad-Tilt Rotor (QTR) transport and stealthy air transport for use by special operations forces, and of high-speed, over-the-beach sealift. Greater emphasis in procurement and R&D also must be given to enhancing the Army's urban warfare capabilities, to include exploiting the potential of robotics to substitute for manpower. If the Army's concept for deploying and sustaining forces in an anti-access/area-denial environment relies on some form of basing structure, then increased priority will have to be given to developing the air and missile defenses to protect them.

Absent some unforeseen and dramatic increase in defense budget projections, liberating the resources required to enable these initiatives will require the Army to reduce its force structure.

To this end, the United States should begin a gradual transference of the ground force defense of South Korea to the Republic of Korea's army. The objective should be to reduce, over time, the Army's current five-division commitment to two divisions. As is currently the case, one division should remain forward-based in South Korea.

Done gradually, this change would incur little, if any, additional risk to US security interests in the region. South Korea has more than twice the population and over twenty times the economic wealth of North Korea. The terrain along the demilitarized zone between the two countries is among the best defensive terrain in the world and the most heavily fortified. Correspondingly, North Korea has not accorded priority to building its version of Iraq's Republican Guard; rather, it has emphasized fielding ballistic missiles and developing weapons of mass destruction, defense against which is not a major (or even likely) role for heavy, mechanized ground forces. With US material support, the South Koreans can field the ground forces needed to blunt a North Korean Army attack.

The Army's commitment to the Persian Gulf contingency could also be gradually reduced from five divisions to three, comprising a digitized corps of three divisions (two of which would be heavy) and an armored cavalry regiment (ACR). This can be accomplished with little or no increase in near-term risk. Iraq's Republican Guard is a hollow shell of what it was a decade ago. Moreover, the US military's inventory of precision weaponry and PGM-capable systems (e.g., aircraft), including their anti-armor capabilities, has grown dramatically since then. If the European rapid reaction force becomes a reality, every effort should be made to encourage our allies to make their forces available for a Gulf contingency, further reducing near-term risk.

Withdrawing these five divisions from the major theater war contingencies does not mean moving from the current 10-division active Army to a five-division Army. Rather, the three-division reduction in the Army's commitment to the Korea contingency would allow for two divisions (i.e., six Interim Brigade Combat Teams) to adopt peacekeeping and urban control operations as their primary mission. This will establish a more than sufficient rotation base for the Service's apparent long-term commitment in the Balkans.

The third Army division should be given the mission of conducting transformation field exercises and experiments that focus on how US ground forces will meet the challenges of tomorrow: projecting and sustaining large-scale ground forces in an anti-access/area-denial environment (to include urban eviction and control operations) and homeland defense. This division should also explore the opportunity to field a maneuver formation able to wage warfare at the operational level principally by employing deep fires. The division's three brigades can each focus on developing the doctrine, systems and force elements for different challenges and/or opportunities, if need be. These exercises should include division and corps staff elements along with brigade staffs to determine if all three echelons of command are still required or if one might be eliminated. National Guard formations should be a part of this transformation process, with their greatest emphasis being placed on peacekeeping operations and the homeland defense mission.

Fortunately, the Army at present has already in place, in the two brigades now conducting exercises, the elements upon which to build a greatly expanded exercise/experimentation



program. Over time, as the Army develops the means for conducting post-transformation operations at the brigade level, the transformation should spread higher, to the division and/or corps level, to determine if both these command echelons should be retained.

The Army should place increased emphasis on those kinds of systems and capabilities that will enable it to operate effectively in an anti-access environment and exploit the potential for deep-strike operations. This means according reduced priority to digitizing and upgrading its legacy formations—the heavy, mechanized divisions. Specifically, Abrams tank upgrades should be given low priority, pending the outcome of the transformation field exercises. The Crusader artillery system buy should be terminated. The system is too heavy to support the Army’s near-term rapid deployment goals and not likely to fare well in the anti-access environment that will emerge over the long term. The Army’s residual heavy forces might replace their Paladin self-propelled howitzers with systems produced by the British (the AS90) or the Germans (the PzH 2000).

The two divisions liberated from the Army’s Gulf contingency commitment would become the billpayers for Army transformation. As for the Army’s two armored cavalry regiments, one should be linked to the digitized corps earmarked for the Gulf contingency. The second ACR could support the JOF in transformation field exercises.

The Army should maintain its five Special Forces Groups (SFGs) and its Ranger Regiment. Efforts should be made to explore how these elite units might best contribute in enabling the Army to insert significant combat power in an anti-access environment, conduct urban eviction and control operations, conduct dispersed operations on a nonlinear battlefield, and pursue extended-range fires/engagements.

The National Guard can also sustain some reductions without significantly increasing the risk to US security. The Guard currently maintains eight divisions that have essentially no role, even in the two-MTW contingencies. This force could be gradually reduced by half, along with their associated artillery brigades. This would leave the Guard with four divisions and 15 Enhanced Separate Brigades. The National Guard should take the lead in the increasingly important mission of homeland defense, to include a major role in national missile defense. Two Guard division equivalents (i.e., six ESBs) should restructure themselves along the lines of the two active Army divisions focusing on the peacekeeping mission. Two Guard division equivalents (i.e., another six ESBs) and six Guard artillery brigades should be maintained as a legacy-heavy, mechanized corps. The remaining three ESBs should be tasked to shadow the three active Army brigades engaged in transformation field exercises, participating when possible. This would enable the Guard to keep apprised of, and involved in, cutting-edge transformation developments.



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## VII. TRANSFORMING THE NAVY AND MARINE CORPS

### THE CHALLENGE

Today the Navy and Marine Corps are responsible primarily for supporting the two-war posture, a range of smaller-scale contingencies and providing forward presence in key regions of vital interest to the United States. To meet these mission requirements, the Navy and Marine Corps maintain a fleet comprising twelve carriers, an equal number of amphibious ready groups (ARGs), some 116 surface combatants and 55 submarines. In all, the fleet counts 316 battle force ships, including 18 Trident ballistic missile submarines that have become the backbone of America's nuclear deterrent. The Marines maintain a force of three active and one reserve divisions, including their associated air wing and support groups.

The Navy and Marine Corps force structure is driven principally by established requirements for maritime forward presence forces. Today the Navy maintains a carrier battle group (CVBG) in two of three regions (the Mediterranean, Persian Gulf, East Asia) eight months out of the year, and a CVBG in the third region twelve months out of the year. The Navy has stated it could maintain continuous presence in all three regions with 15 carrier battle groups. Of greater concern, a JCS study finds that the attack submarine fleet should be increased from 55 to 68 fast attack submarines (SSNs) to meet the demand for these boats to conduct a range of missions (e.g., intelligence, Tomahawk land attack missile (TLAM) strike, carrier escort, anti-submarine warfare (ASW), etc.). Combined, these increases would yield a fleet of some 350 ships. It is far from clear, however, that a future Navy centered on a more-of-the-same approach is either necessary or desirable. Moreover, as noted earlier, neither political party seems inclined to provide the large increase in funding that would be required to sustain the fleet even at today's level, let alone support a major increase.

To make matters more difficult, while the fundamental missions of America's maritime forces—command of the sea, forward presence, power projection, nuclear deterrence and strike, etc.—seem unlikely to change, the competitive environment in which these missions are executed is almost certainly going to change substantially, if not dramatically, over the next two decades. Given the long lead times required to effect major changes in maritime warfare doctrine, and the character and composition of the fleet, the Navy and Marine Corps must begin preparing for these challenges today. But what are these challenges?

First, the good news. It seems unlikely that a peer competitor will arise over the next two decades to challenge America's maritime forces directly for command of the sea. Even great regional powers will not likely be capable of generating large, blue-water maritime forces over the next two decades. Rather, they will likely focus their efforts on developing anti-access capabilities designed to put at high risk the large, fixed forward bases (i.e., major ports and airfields) upon which US ground forces and ground-based air forces rely to project themselves into a region, and to sustain themselves over time. Moreover, maritime forces' ability to strike at extended ranges continues to increase. Thus it seems reasonable to assume that the Navy and

Marine Corps will continue the shift away from emphasizing the open ocean operations that characterized the Cold War and toward operations in the world's littoral regions.

Other militaries' efforts to deny base access will be supplemented by a growing capability to deny maritime forces access to the littoral areas. These area-denial forces will likely comprise a mix of diesel submarines, sophisticated anti-ship mines, land- and sea-based high-speed anti-ship cruise missiles, and land-based aircraft and ballistic missiles. Thus, as currently structured and planned, US maritime forces operating in the littoral will, in coming years, also likely find themselves operating at substantially increased risk of detection and destruction.

Effecting sea control in the littoral presents challenges not encountered in blue waters. An enemy's search area for locating US maritime forces is reduced. Fleet attack warning times are greatly attenuated owing to the proximity to land. The scale and diversity of enemy military capability (i.e., C4ISR and strike assets) that can be brought to bear is increased.

It is also possible to envision new forms of extended-range blockade in which an adversary employs maritime forces (e.g., submarines and mines) in combination with land- (e.g., aircraft, cruise and ballistic missiles, UAVs and UCAVs) and space-based systems. Such an adversary would employ extended-range scouting systems to identify slow-moving maritime craft emerging from, or closing on, port facilities. Mines could be used to slow and canalize movement, while extended-range strike forces engage the target. One suspects that this form of blockade is likely to emerge initially at choke points (e.g., the Strait of Hormuz) or be focused on a few key ports (e.g., those ports in Taiwan that handle liquid natural gas (LNG) and oil tankers). Such operations would require new forms of counter-blockade operations by maritime forces, which might include missile defense, information warfare (IW) and space control operations.

It does not require a huge leap in imagination to envision how an enemy's blockade capabilities might be brought to bear against critical targets in more open waters, as the means for conducting extended-range reconnaissance proliferate and mature, along with the means to conduct attacks at ever greater ranges. Critical maritime targets might include oil drilling platforms, equatorial maritime satellite launch platforms and oil/LNG tankers. Fleet operations designed to provide defense against commerce raiding under these conditions might differ substantially from those undertaken as recently as the escort operations conducted by the US fleet during the 1980s in the Persian Gulf.

In summary, many of the fundamental missions performed by our maritime forces will likely endure during this period of great geopolitical and military-technical change. However, they are quite likely to change dramatically in form, and in scale, over the next two decades. Arguably, one would have to return to the strategic planning challenges confronted by the Royal Navy in the late 19th century to find a period in which the character of maritime missions changed so drastically.

## THE RESPONSE

Much greater emphasis should be given to exploring the potential of the Navy's Streetfighter concept for littoral warfare, and Network-Centric Warfare. Both may prove to be essential

components of an overall maritime strategy for exerting sea control and influencing events ashore in an area-denial environment. The Streetfighter concept rests, to a significant extent, on the potential of network-centric warfare—the Navy’s term for linking a range of combatants, systems (e.g., aircraft) and formations (e.g., Marine units) together in such a way as to provide them with a common, aggregate and highly accurate picture of the battle space (or as much of that picture as is needed to accomplish the mission). The goal is to enable maritime forces to achieve control over the littoral and to support and sustain American and allied forces waging the battle ashore. The Streetfighter concept calls for integrating a range of emerging capabilities—such as new sensors, UAVs, unmanned underwater vehicles (UUVs), and UCAVs—and a new class of smaller, heavily-armed surface ships referred to as Streetfighter combatants, with the other elements of the fleet, to include carrier battle groups, surface action groups, minesweeping craft, and submarines.

To survive and exercise control over the littoral, Streetfighter warships would emphasize speed—both in terms of propulsion and information-based, rapid operational cycle rates—and stealth design over armor for defense. The concept is designed in large part to enable the Navy to seize control over the littoral without placing its high-value assets, such as carriers, at high risk. Reflecting the fact that the area-denial threat is a significant threat *today*, and will only increase over time, the maritime forces’ Fleet Battle Experiments (FBEs) should more properly be called Fleet Battle *Exercises*. Top priority should be given to these FBEs that focus on defeating the anti-access/area-denial challenge. An expanded program of exercises should be undertaken, conducted at both the tactical and operational level of warfare.

Navy Fleet Battle Exercises and Marine Corps “Warrior” series of exercises should be pursued more aggressively with an eye toward how the maritime forces can best meet the emerging challenges and opportunities discussed above. Two FBEs—Foxtrot and Golf—offer encouraging signs that the maritime forces are beginning to orient themselves on meeting the challenges of sea control in the littoral and defeating enemy anti-access/area-denial forces.

Where possible, maritime force exercises should be integrated with other Service transformation exercises. Fleet Battle Experiment Hotel, the Navy component of the first all-Service experiment, is a small, but encouraging, step in the right direction. However, rather than representing an ad hoc effort by the Services, these efforts should be part of a vigorous, well-funded program of joint exercises under the direction of Joint Forces Command.

To best enable its commanders to address emerging challenges, the Navy should experiment with prototype Streetfighter combatants, accelerate work on its Cooperative Engagement Capability (CEC), and develop advanced countermine warfare capabilities. New means of conducting strike operations, to include UCAVs, the advanced gun system and a variety of missiles—including a maritime version of the ATACMS—should have their development accelerated. To inform these strikes, greater priority will have to be accorded to developing a scouting force for the littoral, comprising UAVs, Marine “Hunter Warrior” teams, remotely emplaced unattended ground sensors, and SOF. Until these new capabilities are available, they should be worked into the FBE/maritime exercise effort through the use of surrogates (e.g., manned aircraft or UAVs, in lieu of UCAVs).

Since the fleet itself will be engaged in Fleet Battle Exercises as an integral part of its training, a separate experimental squadron of combatants is neither necessary, nor desirable. However, the newly christened FBEs should make room in the fleet for both surrogate and prototype systems. Systems that merit short production runs should be integrated into ongoing fleet operations, much as the early carrier classes were in the 1920s and early 1930s.

One of the Navy's top priorities, along with a greatly expanded transformation Fleet Battle Exercise effort, should be the conversion of four Trident fleet ballistic missile submarines to conventional missile-carrying submarines. There are several compelling reasons to pursue Trident conversion as the Navy pursues its transformation. The first is firepower and range. Fleet surface combatants must distribute their missile loads to address a variety of missions that include anti-submarine, anti-air and missile-defense operations. Because of its inherent stealth, an SSGN could devote its entire mission to offensive-strike operations. Moreover, the substantial advantage in range that an SSGN's Tomahawk cruise missiles have over carrier-based aircraft would enable SSGNs to strike the same target set while further out at sea, further complicating enemy efforts at detection and counterstrike. Alternatively, SSGNs could initially move much closer to the shore than carriers, still maintain less risk of detection, and strike a substantially greater range of targets.

Based on current SSBN and CVBG deployment and rotation patterns, SSGNs could remain on-station far longer than CVBGs. Carriers typically shuttle back and forth over long distances from their US base to their forward location. This requires the Navy to build three or four carriers for each one that is forward deployed in order to maintain a rotation base. The SSGNs, on the other hand, could rotate crews, enabling the Navy to keep each SSGN on station for a far higher percentage of the time than a carrier. Tridents can be converted to SSGNs at a cost of \$500–600 million each, while carriers cost nearly \$5 billion each, excluding the cost of their air wing.<sup>8</sup> Moreover, SSGN operations, maintenance and personnel costs would be but a tiny fraction of those incurred by a CVBG. In short, Trident stealth battleships offer the Navy a means for conducting strike and forward-presence operations innovatively.

In addition to the four Trident SSGNs and a small class of Streetfighter combatants, the Navy should increase the variety of capabilities in the hands of its commanders by continuing its development of the CVX and DD-21. However, the Service should only commit to buying a few DD-21s until the transformation exercise process can determine how effective they are likely to be in meeting post-transformation mission requirements, particularly in competition with other systems, both existing and emerging (e.g., SSGNs, SSNs, Streetfighters). Reflecting the continued high demand for submarines for a range of missions, the Navy should pursue refueling Los Angeles-Class SSNs and accord high priority on maintaining a sufficient production rate of the new Virginia-Class SSNs to maintain a fleet of 55 SSNs over the long term.

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<sup>8</sup> The cost of SSGN conversion could, however, be as high as \$1 billion per boat to make the necessary modifications to comply with the START II Treaty, if it is not amended.

The Navy also should experiment with a joint mobile offshore base to determine the extent to which it might contribute to Army and Air Force efforts to deploy and sustain forces ashore in an anti-access environment. The JMOB is based on technologies developed to support the construction of large offshore platforms, such as oil rigs. A JMOB is roughly one mile long, might comprise some half-dozen semi-submersible platforms, with a transit speed of 15 knots and a station-keeping speed of 5 knots. It is estimated that a single JMOB could accommodate aircraft up to C-17 size, and store and maintain up to 3,500 vehicles and 150 aircraft. The JMOB should also be tested with an eye toward how it might allow the United States to hedge against the unavailability of bases in austere environments, in cases where an ally refuses to provide basing support and for anti-access/area-denial contingencies.

In conjunction with Army transformation efforts, the Navy also should place greater priority on developing a class of rapid transport ships that are capable of over-the-beach insertion and sustainment of sizeable ground force elements in an anti-access/area-denial environment. There is much that can and should be done, with respect to rapid sealift. At present, for example, the Australian Navy is operating a transport, the *Jervis Bay*, that runs at speeds higher than any US Navy ship, and which can carry a battalion's worth of troops. While awaiting prototype development, the opportunity to rent such ships for use in FBEs should be pursued.

As noted above, unlike the Army and the Air Force, the Navy and Marine Corps force structures are driven more by forward presence requirements than by the two-war posture. To free up resources for transformation, it is appropriate to begin with an examination of how maritime forces should restructure the way in which they conduct forward presence operations. Fortunately, as with the Army, the Navy and Marine Corps are capable of maintaining a high level of US forward presence in ways that would both liberate funding to support transformation, but also incur minimal risk to US security interests.

The Navy currently maintains carrier battle group presence in three regions: East Asia, the Persian Gulf, and the Mediterranean Sea. A CVBG is forward deployed for roughly twelve months out of the year in one region, and eight months out of the year in two other regions. It is not clear why the Navy could not maintain a forward deployment posture of eight months in all three regions. This could reduce its carrier requirement from twelve to ten, with a corresponding (although not identical) reduction in requirements for other naval combatants. The ten CVBGs the Navy asserts are required to support the two-war posture in the near term would be preserved. Once the *USS Ronald Reagan* is commissioned, this would also, for a time, find the Navy operating an all Nimitz-Class carrier fleet, which should help reduce operating costs and facilitate the rotation of crews (see below).

The funding thus liberated would enable the Navy to cover the four-month gaps in *each* region through two means. One involves the use of Surface Action Groups comprising three or four surface combatants. The SAGs' striking power would reside in Tomahawk cruise missiles and, over time, in other missiles, advanced, extended-range surface gunfire support systems (e.g., the AGS and perhaps some UCAVs). A second forward presence option involves the Trident SSGNs. One of these boats could be kept permanently on station in the Persian Gulf and another on station in the Far East.

The Navy should implement its “Horizon” concept of rotating crews among forward-deployed combatants, as opposed to bringing forward-deployed ships all the way back to their home port to effect crew rotations. While major ship overhauls should continue to be performed at home ports, ships can perform needed maintenance during crew rotation periods at forward-basing facilities. This could extend ship rotation rates from the current level of every six months or so to eighteen months and perhaps longer. There are some encouraging signs that the Navy, which already rotates crews on its ballistic missile submarines, may expand the program to include attack submarines as well. This should be considered as only a first step in a more aggressive program to maintain forward presence, while liberating resources to support and sustain transformation.

Finally, the United States should supplement the presence provided by its maritime forces with the growing capability of the other Services, especially the Air Force, to bring power to bear promptly over great distances. The Air Force’s Air Expeditionary Forces, by deploying to forward bases, can provide air presence when carriers are not present. Moreover, the air Force’s long-range bomber force of B-2s, B-1s, and B-52s, with their intercontinental range, represent a formidable military capability that can often be brought to bear more quickly than the air wing of a forward-deployed carrier battle group. To be sure, this form of air power is not a perfect substitute for a CVBG. Forward land-based air forces can be denied permission to launch strikes by their host nation. Bombers operating over great distances cannot generate the sortie rates that carriers can. However, AEFs and long-range bombers, especially when combined with the SAGs and SSGN maritime forces described above, represent a formidable strike force that in some ways is superior to a lone CVBG.

The Marine Corps can also benefit from a comprehensive approach to forward presence consistent with the changes in carrier-based forward presence. The Marines can reduce their ARGs from the current level of 12, to ten, and the number of active Marine Expeditionary Brigades from seven to six, or two per active division. These reductions can be used to liberate funds to support and accelerate Marine transformation initiatives, with minimal increase to near-term risk. Such risk can be further minimized by coordinating with America’s allies to reinforce regional presence. For example, the Anglo-Dutch Amphibious Force might coordinate its deployments to cover a portion of the US ARG gap. Efforts are underway among several Mediterranean naval powers, to include France, Italy and Spain, to deploy a combined amphibious force. Both Australia and Japan are, independently, looking to deploy significant amphibious forces. These efforts should be coordinated to support the common effort to reduce near-term risk while enabling the Marines to prepare for the demanding challenges of tomorrow.

Reflecting the growing difficulties of conducting traditional amphibious assault/forced-entry operations in the littoral, the Marine Corps should scale back the advanced amphibious assault vehicle program, buying two regiments worth. The AAV is designed to enable traditional amphibious over-the-beach assaults. In an area-denial environment, such assaults are likely to be extremely costly. In fact, the Marines have not conducted a large-scale, over-the-beach assault operation against a well-defended coastline in over half a century.

The AAV’s survivability ashore is rather problematic as well. In an age of precision weaponry, putting 20 Marines in a relatively thin-skinned, high-signature armored vehicle seems overly



risky. To its credit, the Marine Corps is pursuing other options for conducting amphibious assaults as part of forcible-entry operations, to include the covert insertion of Hunter Warrior teams to enable the effective application of fleet strike elements, and vertical insertion through the exploitation of advances in aviation. Correspondingly, the Marines should pursue their procurement of the MV-22 Osprey tilt-rotor aircraft, while also exploring other means for inserting and sustaining ground forces in an anti-access/area-denial environment in the event that the MV-22's current technical problems cannot be overcome. Along these lines, the Marines should join the Army in pressing for the development of the Quad-Tiltrotor and Advanced Technology Transport cargo aircraft to facilitate their transformation efforts, as well as experimenting with a joint mobile offshore base. The QTR design calls for an airlifter roughly the size of a C-130, but with the ability (thanks to its tilt-rotors) to both fly at high speeds, and hover and land like a helicopter, similar to the V-22 Osprey. The ATT would be capable of landing on very short, unimproved runways (e.g., a soccer field), and would carry internally the equipment needed to off-load its cargo. Among the key performance metrics for such aircraft would be range, the number of potential insertion/sustainment points it can utilize and perhaps stealth. The Corps also should explore new means of providing tactical mobility, ranging from the Army's Future Combat System to robotic scout vehicles, to maneuver and logistics variants of the MV-22, among others.

Given the likely problems associated with operating in an anti-access/area-denial environment, and the opportunities presented by developments in missile technology and unmanned systems (i.e., UCAVs), the maritime forces should reduce their emphasis on manned aviation. The Navy and Marine variants of the Joint Strike Fighter should be cancelled. The Navy should bridge the gap created by the JSF cancellation in three ways. It can procure additional F/A-18E/F aircraft, which only recently began entering the fleet. It can accelerate UCAV development. Finally, the Navy can pursue other means of conducting strike operations (e.g., Streetfighter combatants, SSGNs, etc.) not currently in the Navy program. The Marine Corps should give strong consideration to migrating away from its current reliance on indigenous fixed-wing aircraft for strike support and toward greater reliance on a combination of attack helicopters (e.g., the Apache and Comanche) and rocket artillery (e.g., ATACMS). Such systems are likely to be more survivable in an anti-access/area-denial environment than are short-range, maintenance-intensive aircraft that must operate out of fixed, forward bases ashore or increasingly vulnerable platforms in the littoral.



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## VIII. TRANSFORMING THE AIR FORCE

### THE CHALLENGE

Like its sister Services, the Air Force is responsible for supporting the QDR's two-war posture, as well as its efforts to shape the security environment by conducting forward presence and small-scale contingency operations. Additionally, the Service has responsibility for strategic and intra-theater airlift and strategic-strike operations. The Air Force also finds itself playing a leading role in two rapidly expanding warfare areas: space and cyberspace. It will likely have the principal mission for ensuring US superiority in each domain in the years to come.

The Air Force currently comprises twenty tactical fighter wings, a bomber force numbering roughly 200 B-52s, B-1 and B-2 bombers and the land-based ICBM component of the US nuclear deterrent. The Service also maintains a strategic airlift fleet of some 250 aircraft and an air refueling fleet comprising over 500 tanker aircraft.

Like the Army, the Air Force has heightened its efforts to project power rapidly in the event of crisis or conflict. To this end, it is restructuring itself into Aerospace Expeditionary Forces designed to provide tailored forces to US regional commanders. The Air Force plans to field 10 AEFs and two Aerospace Expeditionary Wings for rapid deployment. The Service's goal is to be able to deploy one AEF in two days and five AEFs in 15 days. The two-day deployment plan assumes two prepared forward bases are available for use. The five-in-15 plan assumes both bases and large quantities of pre-positioned supplies. Both require most of the Air Mobility Command's transport aircraft, bringing the Air Force's rapid force projection plans into direct competition with those of the Army. Both, of course, also require—and assume—the availability of secure, forward bases, an assumption that is problematic at present, and likely to become increasingly unrealistic as the Air Force confronts the same anti-access/area-denial challenge as its sister Services.

As the anti-access/area-denial threat matures, the Air Force will increasingly have the need (and likely, the potential) to conduct its operations at extended ranges. Unfortunately, the current Air Force structure and modernization program places far too great an emphasis on procuring two short-range aircraft, the F-22 and Joint Strike Fighter, whose survivability in such a conflict environment is likely to become increasingly problematic. Unlike the Army and the Navy, whose forces can at least run the gauntlet through forward bases and maritime choke points, respectively, the Air Force's short-range fighter and fighter-bomber aircraft are effectively chained to large, fixed, forward bases. Barring unforeseen, dramatic improvements in air and missile defenses—and equally dramatic, large-scale increases in air and missile defense force levels and perhaps costly investments in hardened aircraft shelters—aircraft operating out of large, fixed forward bases will do so at ever-increasing risk of destruction by enemy ballistic and cruise missile forces. The risk will grow as other militaries' missile forces grow in size, increase in accuracy and are equipped with warheads carrying precision-guided submunitions, conventionally generated electronic attack munitions (e.g., high-power microwave—HPM—or electromagnetic pulse—EMP—weapons) and weapons of mass destruction (e.g., chemical munitions). The danger to the survivability of Air Force reconnaissance assets, to include the

Airborne Warning and Control System (AWACS) aircraft and the E-8 Joint Surveillance/Target Attack Radar System (JSTARS) aircraft, will also increase as the anti-access threat grows.

In short, with the proliferation of ballistic and cruise missile technology, the Air Force will increasingly confront adversaries that have fielded primarily *missile forces*, as opposed to air forces. While achieving air superiority will remain an important, if not indispensable, factor in the success of future US power-projection operations, the parameters for determining what constitutes air superiority against a missile force remain elusive. There is reason to believe that destroying an enemy's mobile offensive missiles and a mobile, distributed, ground-based air defense network may be far more important—and more difficult—than eliminating his fighter-interceptor force. If so, the F-22, which is primarily designed to prevail in air-to-air combat, may find itself an aircraft in search of a mission.

Moreover, as more states acquire nuclear weapons, Air Force concepts with respect to the use of air power for the purposes of strategic bombardment, may have to be rethought. An aggressor's possession of nuclear weapons could result in its homeland being accorded sanctuary status from US attack, greatly curtailing—if not eliminating entirely—the option of strategic warfare. Thus, air campaigns may be conducted under highly limited conditions, as they were, for example, during the Korean and Vietnam wars. If so, airpower may be applied principally to support limited objectives, such as evicting enemy forces from conquered territory, rather than striking their strategic center of gravity.

## THE RESPONSE

The changing conflict environment mandates a rethinking of Air Force priorities as it pursues its transformation path. In general terms, greater priority should be given to extended-range systems, unmanned systems, the use of space and information warfare, with a corresponding reduction in emphasis on capabilities and systems that do not fall into one of these categories.

Given these considerations, the Air Force should reduce its planned procurement of F-22 aircraft to a silver bullet force of one wing, unless and until the system has proven itself in transformation exercises oriented on power-projection operations in an anti-access environment. The Air Force version of the JSF should be cancelled. The F-16 Block 60 can be procured to sustain the near-term fighter force, as current F-16 aircraft reach the end of their useful service lives. Among other enhancements, the Block 60 version of the F-16 is equipped with an advanced radar and an improved engine, making it a far superior aircraft to earlier F-16 models, and arguably a more capable air superiority fighter than the F-15C. Similarly, keeping the F-15 production line open would permit procurement of F-15Es to cover the reduced F-22 buy, if need be.

Reflecting the growing vulnerability of short-range aircraft, and the increasing irrelevance of employing Desert Storm requirements as a baseline for current major theater war requirements, the Air Force can liberate funds to support its transformation by reducing its tactical air forces from twenty wings to seventeen, eliminating one active F-16 wing and two Air National Guard F-16 wings. The resources made available through these reductions in force structure and

alterations to its modernization program will enable the Air Force to meet the challenges of a post-transformation military regime and more fully exploit its opportunities as well.

To increase its long-range strike assets, high priority should also be given to more aggressive development of other potential long-range strike systems, such as UCAVs. The Service's long-range, precision-strike systems will likely play a critical role in an anti-access environment. At present, the B-2 bomber is the Air Force's only long-range, stealthy, penetrating strike asset and, as such, an important hedge against the growing vulnerability of forward-based aircraft. Service and Joint exercises should accord high priority to assessing the B-2's considerable potential for addressing the anti-access challenge. If these exercises confirm this potential, the B-2 production line should be restarted and significant additional numbers of the aircraft procured.

To defeat an anti-access threat, particularly one with mobile strike assets (e.g., a missile force), extended-range strike systems will require a highly sophisticated and highly robust reconnaissance grid. Extended-range, long-endurance UAVs and unattended ground sensors may play important roles in forming this grid, as may space-based assets and systems under development, such as the Discoverer II radar satellite, which was recently cancelled by Congress, but which should be restarted.

Creating such a system of systems must be an important goal of transformation experiments, with surrogates or (ideally) prototypes of these kinds of systems involved in the process. The Air Force should accelerate its efforts to link the various components of this aerospace architecture through programs like Link 16, while insuring that it can integrate other critical Service elements (e.g., Army deep-strike formations, Navy littoral combatants and their associated C4ISR architectures) into its concept of operations.

Although their vulnerability is likely to increase significantly as the anti-access threat matures, the Air Force and Army have a near-term requirement for 19 JSTARS, but plan only to field a fleet of 15. Consequently, JSTARS is now categorized as a high-demand/low-density (HD/LD) system. To alleviate this immediate problem, at least two additional JSTARS should be procured, for a total of 17. Other HD/LD systems include electronic warfare aircraft, which were in such short supply during the Kosovo campaign that the Navy's EA-6B Prowler had to be pressed into supporting Air Force operations. To address this pressing need, the Air Force might convert 18 B-1B or B-52 bomber aircraft to conduct extended-range electronic warfare missions. This would boost the Air Force's efforts to address this requirement.

Although the C-17 has proven a valuable strategic lift asset, the Air Force must vigorously pursue the development of a strategic airlifter that is capable of inserting and sustaining substantial ground and land-based air forces in an anti-access/area-denial environment. The Quad-Tiltrotor cargo aircraft concept is worth exploring. Also meriting development is a design for an Advanced Technology Transport and a stealthy airlifter for special operations forces

With respect to space, the Air Force should continue to seek opportunities to export C4ISR systems and capabilities that might otherwise be at unacceptable risk if forced to operate in an anti-access environment. The Discoverer II satellite radar—a space-based JSTARS of sorts—is but one example of a program that fits this criteria.

Much of the Air Force's activities with respect to space and information warfare remain shrouded behind a curtain of secrecy. Given the United States' rapidly growing economic investment in space and the growing importance of space to the conduct of military operations, the mission of insuring US access to space in peace and in war and denying our enemies the use of space, if need be, must be accorded high priority.

Information warfare is characterized by enormous uncertainty, particularly at the operational and strategic level. It is impossible to state with confidence whether this warfare regime will be dominated by the offense or the defense, whether such dominance will be enduring or ephemeral, or how to assess the adequacy of our capabilities. Under such circumstances, the need to reduce uncertainty where possible, and to hedge against it where it is not possible must be accorded a high priority. This implies close coordination with the intelligence community to identify potential adversaries and their capabilities; with the US commercial sector that forms the backbone of the national (and in some cases military) information infrastructure to assess whether indigenous means for protection are adequate; and developing a range of capabilities, from computer viruses to conventionally generated electromagnetic pulse weapons, as well as active IW defenses, to cope with a range of possible contingencies.

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## IX. HOMELAND DEFENSE

### BALLISTIC AND CRUISE MISSILE DEFENSES

Over the past several years, concern has grown that a rogue nation, such as North Korea, might acquire a small number of intercontinental ballistic missiles, with which it could threaten the United States. In 1998, for example, the Commission to Assess the Ballistic Missile Threat to the United States (the Rumsfeld Commission) concluded that ballistic missiles armed with weapons of mass destruction pose a “growing threat to the United States, its deployed forces and its friends and allies.” Moreover, the commission found that “the threat . . . is broader, more mature, and evolving more rapidly than has been reported in the estimates and reports by the Intelligence Community.”

Given these trends, the United States is certainly right to pursue the *development* of a national missile defense system. However, such a system is, at best, likely to provide the United States with only very limited protection. Thus, the decision to *deploy* an NMD system should be made only after a range of serious technical, strategic and budgetary issues have been better considered and addressed.

For the foreseeable future, it will be impossible for the United States to construct an NMD system that could defend against a large ballistic missile arsenal such as Russia’s, or the kind of arsenal that China could acquire with a relatively modest additional investment. But even defending against the small arsenal of a rogue state—the goal of the Clinton Administration’s proposed limited NMD system—would be technically very demanding, due to the potential use of decoys and other countermeasures, and the difficulty of exercising such a system under conditions approximating those that might be encountered in war.

In addition, even if an NMD system capable of defending against a small number of missiles can be successfully fielded, the United States would remain vulnerable to a variety of other means of delivering WMD. Indeed, an intercontinental ballistic missile (ICBM) strike may be one of the least likely means of attack. Non-ballistic missile alternatives, such as cruise missiles or cargo ships carrying WMD, are less expensive and easier to develop than ICBMs.

Cruise missiles, in particular, have a number of potential advantages over ICBMs. The range and speed of cruise missiles does not approach that of ICBMs. However, cruise missiles are much smaller than ballistic missiles, making them much more mobile and easier to conceal. This allows them to be placed relatively close to their targets with little chance of detection, especially if deployed covertly (e.g., aboard a cargo ship).

There is also a danger that if the United States moves ahead with the deployment of an NMD system without an agreement with Russia to modify the Anti-Ballistic Missile (ABM) Treaty, the overall ballistic missile threat faced by the United States could substantially worsen. In the short term, because of financial difficulties, Russia may be hard pressed to avoid further reductions, even if the United States were to withdraw from the ABM Treaty. However, concern that an NMD system—especially if later expanded and improved—could pose a threat to Russia’s

shrinking retaliatory capability might lead Russia to adopt a launch-on-warning posture, increasing the risk of accidental launch. Similarly, China might respond to the deployment of even a limited NMD system by increasing its nuclear-strike capabilities, irrespective of whether Russia agrees to amend the Treaty.

This is not to say that the United States should allow the ABM Treaty, or concerns about possible reactions by Russia or China, to block the deployment of an NMD system that would significantly improve US security. However, it does mean that in determining whether an NMD deployment would, in fact, improve US security, the administration and the Defense Department must take into account the consequences such a deployment would have for the Russian and Chinese nuclear programs, among others.

Last year's announcement by President Clinton that he will leave it to the new administration to decide if and when to deploy a NMD system is appropriate. The system under consideration has been tested only three times, under relatively benign conditions and failed twice. Moreover, even if the system proved marginally effective, by choosing to deploy as soon as possible, the United States would, to a considerable extent, be locking itself in to a missile defense system based, substantially on current information-based technologies which will rapidly obsolesce. In addition, the proposed system would be very costly to develop and field. We estimate that the first phase of the administration's proposed NMD system is likely to cost some \$34 billion over the next 15 years, while the full system being contemplated could cost as much as \$57 billion. Moreover, procurement and operations and support costs would consume most of this funding, leaving less funding available for development of what might be more promising technologies. But the opportunity costs do not end there. Given the current budget priorities of both parties, deploying an NMD system would also likely siphon off funding needed to sustain the readiness of US forces, as well as funding for their modernization and transformation.

Given all of these concerns, it seems clear that a decision to begin deployment of the system currently being developed by the Defense Department, initially comprising 20 and later 100 ground-based interceptors, would be premature. The United States should, however, aggressively pursue the development of NMD technologies, including a broad range of possible systems. The Defense Department should also continue to work toward the *near-term fielding* of theater missile defense systems. TMD systems will provide at least some protection to forward-deployed US forces that may be put at risk by what is already a substantial theater missile threat and allow DoD to test some doctrines, organizations and concepts of operation that might prove relevant for a future NMD system as well.

In addition, upon assuming office, the new administration should undertake an immediate, comprehensive and rigorous strategic review that includes: a realistic assessment of current US capabilities for deploying an NMD system that would be *effective* against small numbers of ballistic missiles; the ability of a potential adversary to readily offset the effectiveness of such a system; consideration for how cruise missile defenses, in particular, would fit into any defensive system; and a sense of how national missile defense would fit within an overall US strategy that exploits the full-range of US military capabilities—such as long-range precision strike, space systems and special operations forces—as well as arms control and counter- and nonproliferation initiatives.



## DEFENSE AGAINST BIOLOGICAL AND INFORMATION ATTACKS

Defending the American homeland in the decades ahead will require new approaches to cope with the emerging threat of advanced biological warfare and information warfare. These two rapidly emerging threats have attributes that make them especially troubling. Not only are they potential weapons of mass destruction or disruption, but they are capable of being employed to achieve a strategic surprise. The potential reach of these weapons and the large number of ways an attack could be carried out will complicate our efforts to defend against them, and the capabilities on which they are based are advancing rapidly and are widely diffused. The perpetrator of such attacks could, under some circumstances, even remain concealed to us. Several countries, including those who have engaged in state-sponsored terrorism, are pursuing biological warfare and information warfare programs.

Defending against these emerging threats to the American homeland far transcends the purview of the Department of Defense, and the organizational implications of homeland defense require further study than can be provided here. Nevertheless, it is quite clear that the Defense Department will have an important role to play in preventive defense against such attacks, as well as in consequence management in the event they occur.

Funding should be increased substantially to prepare our public health system to respond to a large-scale bioemergency. (The Department of Health and Human Services currently spends under \$300 million a year to prepare for bioterrorism.) Bioemergency preparedness measures that should be considered for increased funding include the provision of protective gear and specialized training for first responders, the development of more sophisticated epidemiological data bases and effects models, improved networking of medical treatment facilities, and stockpiling of common vaccines and decontamination equipment. Funding should likewise be increased substantially to develop new sensors to detect and classify biological agents and other biological warfare defenses. (Spending within the Defense Department on biological warfare defenses is likewise currently in the \$300 million range annually.)

Programs for the protection of computer networks and other critical infrastructure are better funded (about \$2 billion per year), but this is an area of rapidly evolving technology, and, as the Marsh Commission and Defense Science Board have noted, our defenses against IW attack remain inadequate. Funding in this area, for improved firewalls, intrusion detection, etc., should likewise be increased significantly.



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## X. TRANSFORMING THE STRATEGIC TRIAD

The advances in weapons lethality and precision projected to occur over the next several decades hold the potential to revolutionize warfare, to include nuclear forces and strategic-strike operations. Although nuclear weapons have dominated discussions of such operations since their appearance at the end of World War II, the United States may increasingly be able to rely on both precision-guided munitions and electronic means of attack to effect a significant displacement of nuclear weapons, transforming the strategic triad and helping to pave the way for deep cuts in the current US nuclear arsenal.

These reductions could strengthen the nuclear Non-Proliferation Treaty (NPT) regime and encourage Russia and the other major nuclear powers to make deep cuts in their own nuclear arsenals. They could also yield significant savings of perhaps \$2 billion a year over the long term.

The emerging military revolution strongly suggests that the conventional tortoise has, after some fifty years, finally begun to catch up to the nuclear hare, due in large measure to radical advances in the effectiveness of precision-guided munitions, and the effectiveness of stealth and electronic means in cloaking aircraft and missiles from enemy detection. As progress is made in US non-nuclear capabilities, it will be increasingly appropriate for the United States military to consider transitioning to a new type of strategic triad. Such a triad would not be based on the traditional three types of delivery systems for nuclear weapons—bombers, land-based ballistic missiles and ballistic missile submarines. Rather, the new triad would comprise long-range conventional precision-strike, electronic-strike and residual nuclear-strike forces.

The United States need not wait decades before beginning to make deep cuts in its nuclear forces. Given the US military's recent progress in expanding its precision-strike capabilities and the fact that it is the only military at present able to begin the transformation to a new strategic force posture, the United States should be willing to make some substantial additional reductions over the next several years—and to do so unilaterally, if necessary. The United States should immediately move to reduce its nuclear forces to the 3,500 warhead level allowed under the START II Treaty. These reductions are driven by strategic calculations, not out of a desire to create good will or a commensurate response from Moscow. Simply put, the United States has excess capacity in its nuclear forces for which it is paying a relatively high premium to sustain. These resources can be put to better use in maintaining the readiness of US forces and also in sustaining modernization and transformation initiatives.

The United States should also seriously consider making additional reductions to the 2,000–2,500-warhead level tentatively announced as the goal for a future START III Treaty. Furthermore, with the cooperation of Russia and the other major nuclear powers, reductions to 1,000–1,500 warheads might well be prudent over time.

In summary, the US military's revolution in precision-strike capabilities offers a significant conventional, strategic precision-strike hedge, with the promise of an emerging additional

electronic-strike hedge. The new administration should take advantage of the opportunity created by this progress in conventional forces to lead the way toward lower nuclear force levels.

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## XI. TRANSFORMING THE INDUSTRIAL BASE

### THE CHALLENGE: A SMALLER—AND DIFFERENT—DEFENSE INDUSTRIAL BASE

Over the past decade, a great deal of attention has been focused on how modernization plans and force structure should be changed to reflect the end of the Cold War and budgetary realities. Far less attention has been paid to the question of how the US defense industry is likely to be affected by changes in the shape and level of defense spending, or what steps must be taken to ensure that the United States retains a healthy defense industrial base. This is unfortunate. Over the long term, the United States' ability to field effective military forces depends critically on having access to a healthy defense industrial base capable of producing the right kinds of weapon systems and doing so in a timely way. This chapter provides a brief overview of defense industrial base issues and offers some suggestions as to how the Defense Department might preserve a healthy industrial base that is also capable of the innovation required to support a transformation strategy.

As noted earlier in this paper, current defense planning, programming and budgeting must be carried out under conditions of relatively high geopolitical and military-technical uncertainty. Relative to the Cold War era, there is high uncertainty over the kinds of threats we will face over the longer term, and over our ability to exploit rapid advances in technology to field the military capabilities best suited to deterring or, if need be, defeating future threats. Historically, military organizations that successfully confronted this kind of strategic environment often relied on a very different approach to modernization (and hence support from the industrial base) than did the United States during the Cold War or at present. Specifically, they accorded great weight to hedging against uncertainty. They did this by:

- avoiding, to the maximum extent possible, locking in to purchasing large numbers of existing systems and capabilities any sooner than was absolutely necessary. (To be sure, such purchases were at times needed, and appropriate, to replace systems that had reached the end of their useful lives.)
- developing, to the maximum extent possible, a range of promising new capabilities that could be field tested to determine their potential effectiveness against emerging threats.
- insuring the vitality of the defense industrial base, both within the existing military regime and the very different one that seemed likely to emerge, in order that it might sustain the current military and tomorrow's force as well.

Promoting relatively short (operationally significant) production runs of new systems/capabilities also served as a means of avoiding dead ends—the situation that occurs when promising new systems/capabilities fail to pan out. Compared with current DoD practice, a procurement strategy characterized by relatively short production runs of a significantly greater range of systems and capabilities offers many more opportunities for defense firms to bid for business than is currently

the case. Providing a substantially greater number of bidding opportunities, encourages firms that might have otherwise abandoned the defense business to remain and compete. Correspondingly, additional contractual opportunities seem likely to enhance the prospects for competition—and innovation.

Regrettably, there exist today several barriers to implementing this critical element of defense transformation. One major barrier is a defense program that is far too ambitious for the defense dollars projected to be available to support it. This has led to a Wal-Mart approach to defense modernization, in which the Defense Department is incentivized to buy in bulk—i.e., buy relatively few new systems in relatively large quantities to drive down unit costs, so as to modernize the current force structure. Another principal barrier is found in the institutional norms established over the Cold War years that emphasize planning against immediate threats, rather than against the very different challenges that will quite likely emerge over the mid-term future. There are also concerns that any major change in the Defense Department’s procurement strategy will heighten investor anxiety over the Defense Department’s reliability as a customer. This could lead investors to view defense firm stocks as increasingly risky holdings, thereby eroding the industry’s financial standing and fiscal health.

In addition, the defense industrial base’s contraction and consolidation, in response to the US defense draw down following the Soviet Union’s collapse, has produced its own barriers to industrial support of transformation. In a number of important sectors, only a couple of firms remain to support the Defense Department’s requirements for advanced military systems. This has raised questions concerning the potential for de facto monopolies to emerge within the industry, reducing competition and innovation at the very time we confront a period of rapid technological change.

## THE RESPONSE

Ironically, the barriers to innovation seem to be falling for would-be competitors. Access to technology—particularly those information-related technologies that are driving the military revolution—is becoming ubiquitous. Barriers to accessing military-specific technology have been lowered, substantially in some cases, following the Cold War’s end. The rapid diffusion of advanced military-related technologies seems likely to erode, at least partially, this country’s long-held dominant technological advantage with respect to military capabilities.

We must address two critical issues with respect to the defense industrial base. First, how do we transform a consolidated defense industry so that it can, under very different conditions than those that existed during the Cold War, enable our military to meet now emerging military challenges? Second, how do we insure its long-term economic health?

With respect to transforming the defense industry, given technology diffusion and the ongoing globalization of the defense industrial base, the United States may want to emphasize three new core competencies in its defense industrial sector as part of an offset strategy:

- *Architecture Integration*: This is an emerging competence that extends beyond systems integration to achieve the integration of a range of systems. This means creating a systems

architecture, or system of systems. The sources of competitive advantage are twofold. First, US industry should strive to ensure it can generate more value added from widely available technology than any other industry. Second, the ability to extend its competence beyond systems integration and into architecture integration would mean that US industry could generate a far wider variety of products—or product combinations/configurations—than could any prospective adversary. This advantage in the range and complexity of the industry’s product line could prove an important source of competitive advantage. Importantly, the source of advantage here is based relatively less on technology and more on skilled people (e.g., design teams) and processes (e.g., computer-assisted design and manufacturing).

- *Time-Based Competition:* Here again, competitive advantage is derived less from technology per se than from the defense industry’s ability to translate widely available technology into military capability more quickly (and, perhaps, on a greater scale) than can other industrial bases with similar technology access. Of course, the ability to field new capabilities rapidly does not guarantee that the **right** capabilities are being fielded. This ability, or competence, does, however, offer defense planners a greater opportunity to await developments, thereby enabling them to reduce the level of uncertainty with respect to those capabilities that are, in fact, needed. At least three barriers exist to developing this capability: the DoD acquisition system, the Defense Department’s current RDT&E and procurement strategy and the greatly reduced number of firms comprising the defense industry.
- *Extended Production:* The US defense posture—with its emphasis on waging wars and achieving rapid, decisive victories—may be assuming away the many difficulties that might arise if a future conflict became protracted. The ability of militaries to prognosticate the length of wars is not terribly encouraging. World War I, many thought, would be over in a few weeks. More recently, many NATO leaders were stunned to find the Serbians refusing to yield Kosovo after a few days of bombing. Yet the trend toward defense industry globalization means that, increasingly, US defense production capability will rely upon offshore support. As globalization proceeds, ways must be found to hedge against the denial of that support in critical areas during a protracted conflict.

As for sustaining the long-term health of the defense industry, while also promoting innovation within the industry, several initiatives seem warranted:

- *Defining Post-Transformation Requirements:* To foster innovation in the defense industry, the Defense Department needs to determine those technologies that have matured and are on the flat of the curve (i.e., at the point where large investments would be needed to squeeze out even small improvements in military capability) and which technologies have major growth potential. The Defense Department must be willing to declare certain technology sectors to be mature and redirect its R&D dollars into technologies with more potential. Such a determination should be linked closely to the Department’s best guess as to what will constitute future military requirements. These requirements should be derived from the determination of those key military competitions (e.g., power projection in an anti-access/area-denial environment, space control, etc.) that will dominate the post-transformation environment.

- *Retaining Key Personnel:* The defense industrial sector is currently experiencing difficulties in retaining key personnel, particularly in the science and engineering fields. Reasons cited for this problem include the absence of intellectually stimulating, cutting-edge work and the lack of financial benefits, such as stock options. The need to act promptly is made even more acute as defense firms stand to lose much of their intellectual capital in the next few years with the retirement of many of the Cold War-era employees. (It should be noted that the Defense Department faces a similar problem with respect to its own civilian work force.)

The Defense Department should examine restrictions on the Federal Acquisition Regulations (FARs) and on salary caps to enable human intellectual capital to be rewarded at a more competitive rate. Fortunately, the strategy proposed in this report—which calls for shorter production runs of a wider range of military systems, more stable procurement budgets and programs (as a consequence of more realistic estimates of operations, maintenance and personnel costs than is currently the case), and increases in R&D funding (particularly in the area of S&T)—will create a greater number of cutting-edge defense projects to stimulate the industry’s highly skilled work force.

- *Refocusing R&D Investment:* The Defense Department’s R&D budgets are projected to decline significantly over the next five years, and may decline further still, given the pattern of migrating funding toward the operations, maintenance and personnel accounts, in an attempt to maintain the high levels of readiness required under the current defense posture.

Another problem is that, under the current plan, R&D funding is largely focused on the full-scale development of a relatively small number of next-generation systems. Yet the greatest breakthroughs in technology typically occur at relatively early stages of the R&D process; specifically—in the S&T phase. Programs and activities also tend to be relatively inexpensive during this phase. Conversely, the engineering and manufacturing development (EMD) phase of R&D, where the finishing touches are put on new designs being made ready for production, is generally very expensive. Unfortunately, under the current defense plan, so much funding may be absorbed by the EMD phase of R&D that funding for S&T risks being crowded out even further.

Making matters worse, the EMD cost of individual programs has grown at a vigorous rate. Consequently, only a relatively small number of programs can be supported through EMD, even within an annual R&D budget averaging \$35–40 billion a year. This also means that, under the current plan, there are likely to be long gaps between the completion of EMD on one system and the development of its follow-on. This may make it increasingly difficult for the defense industry to retain the design teams skilled in the systems and architecture integration that is increasingly critical to the development of successive generations of advanced military capabilities.

Still another problem is that, under the current plan, R&D at all levels is focused primarily on the development of more advanced versions of *existing* weapon systems, such as manned fighters, aircraft carriers and howitzers. Only a small amount of funding is focused on researching or developing new kinds of weapon systems, such as UAVs or small Streetfighter surface combatants. In short, under the current defense plan, although overall



funding for R&D would remain relatively high, the investment strategy for allocating these funds seems unlikely to encourage innovation in the defense industry. The problem is that, at present, the Defense Department is providing few encouraging concepts to chase. Consequently, the Defense Department should strongly consider fencing, or earmarking R&D funding, specifically for transformation and innovation.

There also is a strong need to put the “I” back into IR&D. Due to shortfalls in R&D funding, the Services are encouraging defense firms to allocate their independent research and development (IR&D) funds to current programs rather than pursuing new, innovative capabilities. Firms need to be free to employ their IR&D funds to encourage innovation and to provide a stimulating work environment for the best and brightest young scientific talent. The scale and orientation of a firm’s IR&D investment is also linked a firm’s belief that it will eventually make a return on its investment. Steps need to be taken to insure that firms whose IR&D efforts yield significant breakthroughs are rewarded with profit margins that are commensurate with the risks they have taken to achieve a high level of innovation.

- *Preserving Financial Stability:* To insure a financially healthy defense industrial base, one that can support both transformation and sustain the post-transformation military, the Defense Department should explore several initiatives. One involves offering defense firms the opportunity to share the cost savings they realize through greater efficiencies with the Defense Department. Another option, increasing progress payments for industry, also merits attention. This latter option does involve some significant up-front costs. While there is no significant long-term effect on the budget, increasing progress payments from the current rate of 75 percent to 85 percent would increase current outlays by about \$1 billion a year in the near term.

As the Defense Department’s modernization strategy is adapted to better support the transformation strategy outlined in this report, careful consideration must be given to the consequences for the defense industrial base. For example, if the Defense Department were, as part of its transformation strategy, to cancel the Joint Strike Fighter program currently being competed between Boeing and Lockheed Martin, it would still want these firms to remain fiscally healthy (so as to assure competition for future defense programs) and to retain their skilled workforce. Consistent with this requirement—and the need to maintain a ready force in the near term while creating options for the future—the Defense Department might extend production of the F/A-18E/F (whose prime contractor is Boeing) to cover the Navy’s JSF gap, and the F-16 Block 60 (whose prime contractor is Lockheed Martin) to cover the Air Force’s JSF gap. It might also pursue more aggressively the development ofUCAVs and other strike programs (e.g., advanced versions of Tomahawk cruise missiles and ATACMS missiles) that may be competed for by both firms and other firms as well.

Among the other initiatives meriting consideration to insure a healthy and innovative defense industrial base are:

- *Providing funding/program stability:* Making frequent changes in planned procurement quantities or funding levels often results in inefficient production rates and higher unit costs.

- *Pursuing multiyear procurement:* By adding greater predictability to production plans, multiyear procurement contracts can lower unit procurement costs.
- *Designing more commonality in systems:* Increased commonality could make the defense industrial base more efficient, among other things, by allowing the Defense Department to reduce program redundancy.
- *Increasing reliance on commercial off-the-shelf (COTS) technology:* COTS technology tends to be less expensive than military-unique technology. Perhaps more importantly, increased use of COTS technology would result in a defense industrial base that is more thoroughly integrated into the civilian economy, improving both surge and mobilization capabilities.
- *Reducing or closing underused facilities:* Defense firms can be encouraged to reduce excess capacity by allowing them to keep a share of the savings they would achieve by doing so, rather than passing all such savings onto the government (which is what happens under the cost-plus fee contracts widely used by the Defense Department).

In conclusion, any plausible strategy, including the transformation strategy outlined in this report, that is adopted by the Defense Department to fulfill its role in ensuring the nation's security will require the support of a sizeable, innovative and fiscally sound defense industrial base. A significant reduction in the size of the industrial base was both inevitable and desirable following the Cold War's end. However, the reduction in the number of suppliers may have overshot the mark, limiting the healthy competition among firms (and the innovation that is associated with it) that works to the Defense Department's benefit. Indeed, today the United States possesses an industrial base that is not only significantly smaller than its Cold War antecedent but also arguably less innovative and less robust. Steps must be taken to insure that the defense industrial base can both support the significantly different procurement strategy that characterizes periods of military transformation and sustain the post-transformation force once it is achieved. The proposals outlined above are intended to support such an approach.

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## XII. TRANSFORMING AMERICA'S ALLIANCES

Over the last century, alliances have played an important role in enabling the United States to reduce the risk to its security by pooling its military resources with those of other, like-minded states. Regrettably, the value of a well-crafted alliance structure has received little attention in the major reviews of US defense strategy over the last decade, by both the Pentagon and various blue-ribbon panels. This relative level of disinterest is ill-advised, as the United States will likely find itself relying on allies far more over the next two decades than it did during the decade which has just passed into history.

Greater attention needs to be paid to US alliance relationships and the long-term US alliance structure, for several reasons. First, even those advocates of a QDR-based defense posture acknowledge that America's current defense program is too ambitious to be sustained by the defense budget projected. More importantly, the rise of great regional powers will increase drastically the *scale* of military capability which potential competitors can generate. Moreover, the military revolution is giving the militaries of many states—great regional powers and rogue states alike—the means to create new *forms* of military capability, greatly increasing the uncertainty under which US defense planning must proceed. New military capabilities must be developed to provide hedges against this uncertainty. At the same time the United States will almost certainly find itself according an increasing share of its defense resources to defending the homeland. This homeland defense tax will leave a relatively smaller share of the defense budget available to maintain stability in key regions abroad. Finally, the Defense Department needs to make the investments outlined earlier in this report to enable US military transformation.

Although the United States will find itself increasingly dependent upon allies for support, it may require a somewhat different set of alliances than exists today. Moreover, it will almost certainly require very *different* forms of support from its allies. Restructuring alliance relationships to meet these requirements will take years, and perhaps a decade or two, to accomplish. Hence it is no exaggeration to say that a strategic assessment of America's alliance relationships should be undertaken now, while the opportunity to shape the future is at its greatest.

Fortunately, the United States' current alliance posture is one of great strength. Emphasis should be placed on maintaining existing core alliances with great regional powers: those comprising the core of NATO/EU (i.e., France, Germany and Great Britain), and Japan. This will likely prove more difficult than during the Cold War, when America and its allies were bound tightly by an immediate, overarching threat. Owing to the transformation of the geopolitical order, the global economy and the military-technical environment, the United States might find certain countries' potential value as allies increasing substantially. Thus relationships should be preserved and expanded with key existing, and potentially rising, second-tier military powers, to include Australia, Israel, Korea, Turkey, and perhaps Singapore and Taiwan. Finally, America should try to avoid an active military competition with the other rising (or recovering) great regional powers. Relationships should be cultivated with China, India and Russia, in particular, with the objective of avoiding the creation of a counter-US coalition, among some or all of these powers. In summary, the ultimate goal is to minimize the risk to America's global position, and the defense resources required to sustain it, by preserving relationships with key long-term allies,

and by promoting friendly relations with other powers in such a way that, if a great power challenge is posed to US security interests, it is relatively isolated and not part of some grand counter coalition.

The United States also needs to effect a new division of labor for military missions between itself and its allies to better provide for both near- and long-term security. This division of labor should take into account potential changes in ally durability and reliability. The durability of America's allies will be relatively more problematic than during the Cold War, given the dynamic character of today's international order, relative to the bipolar system that characterized the long-term US-Soviet competition. Similarly, the reliability of America's allies will be relatively more suspect since security concerns have become more regional, or local, in character, yielding ad hoc coalitions, or coalitions of the willing. A new division of labor also must address the new missions brought on by the military revolution (e.g., precision strike, space control, information warfare at the strategic level, ballistic and cruise missile defense, power projection in the absence of fixed, forward bases, counter-area denial operations, etc.); and the likely shift in the United States' geopolitical focus from Europe to Asia.

To this end the United States should accord high priority to maintaining a dominant military capability in its core mission areas, both in the current (pre-transformation) and post-transformation periods. That is to say, the United States should avoid, if at all possible, arriving at a division of labor between itself and its allies that finds an ally having primary responsibility for a key mission area. Rather than having its allies occupy key niches (e.g., maritime countermine operations), the United States should stress the layering of ally capabilities atop its own. This would enable the US military to scale up quickly its existing combat potential in certain areas, if need be.

The United States should support the efforts of selected allies to develop advanced, post-transformation military capabilities. For example, assistance might be provided to enable Australia, Israel, Japan, the principal NATO allies, and the Republic of Korea to develop their own anti-access forces, as well as missile defense capabilities. Great Britain, in particular, could be supported in its efforts to create power-projection forces that can operate effectively against anti-access forces and, along with Australia and Japan, in their efforts to create forces to frustrate multi-dimensional (i.e., land-, space- and sea-based) maritime commerce raiding and blockade.

If the United States is going to transfer key military technologies, both to enhance its value as an ally and to increase the effectiveness of ally military forces, it will want the recipient allies to be both durable and reliable. It makes little sense to effect such transfers to states where there is a substantial risk that, over time, they might pass on these technologies to potential competitor states or even become competitors themselves. This presents the United States with a dilemma: the transfer of military-unique technologies increases the attractiveness of the United States as an ally, yet in an era of high uncertainty the subset of allies that are deemed to be both durable and reliable over the long term is likely to remain quite small for the foreseeable future.

It may, however, be possible to move toward alliance relationships that emphasize allied *access* to American capabilities, based on proprietary US technologies, on an as-needed basis. Such a limited access approach might be workable with respect to America's global C4ISR architecture,

which is projected to be a highly networked system of systems. The United States might allow allies to tap into the architecture on an as-needed basis. Allies would thus receive support from an entire systems architecture, comprising a range of integrated systems, rather than being sold individual systems. By retaining the architecture rather than transferring it, the United States may be able to mitigate some of its concerns with respect to ally reliability over the long term, while remaining a good provider of military support during a crisis or conflict. The United States should also consider temporary transfers of military hardware and software that could provide a quick and substantial, but temporary, boost in military capability. Precision-guided munitions are one example; certain forms of information warfare, or electronic strike, may be another.

If it is to ensure a long peace, the United States will have to transform its military and most likely assist in the transformation of its allies' militaries as well. This means America will either have to apportion substantial additional resources for defense—a highly unlikely prospect at present—or ask its allies to assume a greater role in providing for the common defense. To this end, a concerted effort should be made to exploit America's allies' increasing capability to conduct peacekeeping operations. Long-standing allies like Australia and Canada have, over time, oriented their militaries more toward peacekeeping operations. Several of our NATO allies, France and Great Britain in particular, are capable of conducting major peacekeeping operations over extended distances.

As discussed earlier, the United States should also rely on its allies to provide significant support forces in any near- to mid-term major regional conflict. Specifically, the Republic of Korea should assume greater responsibility for its ground defenses, to the extent that, over time, the US Army can reduce the number of divisions earmarked for the Korea contingency from five to two. In return for the protracted deployment of US Army troops in the Balkans, if the EU succeeds in its goal to field a 60,000-strong expeditionary force by 2003, America's European allies should be strongly encouraged to commit this sizable force in the event of a Persian Gulf contingency.

To relieve some of the burden on US maritime forces, the navies of America's principal maritime NATO allies—France, Great Britain and Italy—should be encouraged to maintain a significant naval presence in the Mediterranean Sea, particularly during periods when US CVBGs are not forward deployed in the region. As noted earlier, Great Britain and the Netherlands, as well as France, Italy and Spain, have created or are creating maritime forces capable of covering gaps in Marine ARG deployments within the region. A similar possibility may exist, over time, with respect to Australian and Japanese maritime forces in East Asia.



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### XIII. TRANSFORMING AMERICA'S GLOBAL BASING STRUCTURE

For America's allies, the value of the bases they have provided to support forward-deployed US forces has offset, to a considerable extent, the relatively modest military contributions they have made to the common defense. However, their value will likely change dramatically over the next few decades, a trend that should exert a major influence on any US strategic review of its alliance relationships. First, US access to forward bases will likely become more problematic as ad hoc coalitions have become the rule and base access can be withheld on a moment's notice. Such was the case with Saudi Arabia, which in November 1998, seemed likely to grant US aircraft access to its bases for strikes against Iraq, but withheld access a month later when Operation Desert Fox actually took place. Even more recently, during Operation Allied Force, American military forces' access to forward NATO bases varied widely, even though the operation itself had been sanctioned by the alliance as a whole. Thus US aircraft operated out of bases in Italy but were banned from doing the same by Greece, another NATO front-line state.

Second, the relative value of forward bases will change due to geographic factors. That is to say, as the locus of great-power competition continues to shift away from Europe, it may be that forward bases simply do not exist where they are needed. The United States encountered such a problem in attempting to deploy forces into Albania, which possesses an austere transportation and basing infrastructure, during Operation Allied Force in 1999. A similar problem would arise if, for example, a crisis erupted on the Asian subcontinent or in the Spratly Islands.

Finally, the value of certain forward bases is likely to diminish as a consequence of the diffusion of anti-access capabilities that will enable even militaries of the second-rank to hold large, fixed bases and supply points at high risk of destruction. In this case, the value of ally forward bases could change, in some cases dramatically, depending upon how the United States attempts to meet the anti-access challenge. In addition to ensuring the ability of US forces to prevail in war, basing options should be viewed with an eye toward how they enable America to accomplish the following:

*Shape the security environment through forward presence.* Even if it were possible for the United States to divest itself of all its forward bases and still maintain a favorable military balance in key regions around the world, it would still need to preserve a visible presence. Such a physical commitment of forces has, in the past, served as a deterrent to would-be adversaries while providing a measure of assurance to allies within the region. The challenge, thus, is to transform the US forward basing structure to reflect the emerging strategic environment. However, the global basing structure also represents a likely means of adjusting, over time, the projected relative mix of forward-based and extended-range forces, in favor of the latter.

*Influence the dynamics of military competitions in periods of crisis.* As many of America's existing forward bases become increasingly at risk of destruction from extended-range strikes, crisis instability may increase. This is because an adversary will have a strong incentive to strike

before the United States can disperse its forces from their bases. Hence the development of a survivable basing mode will likely be an important factor in preserving crisis stability.

*Allow the United States to hedge against perturbations in its alliance structure.* In an era of great geopolitical change, ad hoc coalitions are increasingly in vogue. As noted above, ally reliability and durability will be increasingly problematic as the Cold War era fades from memory. Alliance structures may not exhibit the kind of rigidity they did during the bipolar international regime that characterized the long-term US-Soviet competition. If the world is progressing toward a multipolar system, a case can be made that alliance structures will be more transitory, or fluid. In such an international order, the United States' ability to adapt rapidly its basing structure in response to shifts in alliance relationships could prove critical to preserving favorable military balances in key regions.

While a thorough assessment of US basing options is needed, it also is beyond the scope of this paper. However, a brief discussion of some prospective options follows to provide a first-cut look at the problem.

## SANCTUARIES

The United States could choose to maintain its current basing arrangements in the hope that these bases will be sanctuaries in the event of a future conflict. Such a basing posture would rest on two assumptions. First, with the spread of weapons of mass destruction, wars may become highly limited due to mutual concerns over the consequences of escalation. Instead of total war, future conflicts may more resemble the Korean War, in which the homelands of the great powers (China, Japan, the Soviet Union, and the United States) involved were accorded sanctuary status. Second, missile defenses might become far more effective than our experience with them to date would suggest. Other, quite expensive, options, such as hardening existing base facilities (e.g., aircraft shelters, supply centers), might provide some relief. However, retaining the current approach to forward basing while relying on these assumptions would almost certainly represent an increasingly high-risk proposition.

## PERIPHERAL BASES

In the future, an enemy's robust anti-access capability may force the United States to build up strength first along the periphery of an enemy's military reach. During World War II, for example, United States forces found themselves establishing bases along the periphery of the Axis empires in Europe and East Asia. From these bases, in places like Australia, England and North Africa, US and allied forces engaged German and Japanese forces, gradually pushing them back. Anticipating this, the United States might establish a network of peripheral bases from which to employ extended-range US military systems, and to serve as a staging area for forces and supplies moving from the United States to the threatened theater. Under this approach, allies located along the periphery of potential conflict areas, such as Australia and Turkey, might increase substantially in value.



## DISTRIBUTED BASES

The United States might develop a substantially larger network of relatively austere forward bases than it maintains today. This basing scheme is somewhat similar to the multiple aim point basing arrangement envisioned for the deployment of the MX Peacekeeper ICBM.<sup>9</sup> This basing approach assumes that, at any given time, only a relatively small fraction of these bases would be in use and then only for brief periods. This would require major changes in US military systems, force structures, base-operating procedures, and doctrine—i.e., a transformation. The potential benefit is that, to attack forward-based US forces with a high degree of effectiveness, an enemy would have to strike most, if not all the bases, since he could not be certain which bases were currently being used by US forces. Moreover, a distributed basing scheme could facilitate the employment of preferential defenses against the ballistic and cruise missile threat.<sup>10</sup> If key allies and de facto allies (e.g., Japan and Israel, respectively) pursue this basing option as a solution to their own forces' increasing vulnerability, the United States should make every effort to profit from their experience and, where appropriate, support or even become a participant in it.

## MOBILE BASING

An obvious way to reduce the vulnerability of US forward-deployed force elements is to make their bases mobile and thus more difficult to target. Today the United States possesses mobile bases of a kind in the form of its Navy carrier battle groups and Marine amphibious ready groups. These platforms, however, are highly limited both in their capacity and in their ability to project power ashore, especially at extended ranges. Another option, the Joint Mobile Offshore Base merits serious consideration. The JMOB is a multi-module floating structure based on the offshore platform technology. It would extend roughly one mile long, provide some 115 acres of storage space and accommodate 150 helicopters or very short take-off/landing (VSTOL) aircraft. It could handle large transport aircraft like the US Air Force's C-17s and C-130s. To the extent they can be deployed in open waters, MOBs, which can move at a transit speed of up to 15 knots, can further complicate an adversary's targeting requirements. If practicable, these bases offer the advantage of contouring the US footprint, or presence, on allied territory to fit the host nation's political and cultural needs. They also can be moved (albeit slowly) both in the event of crisis in another sector or if a shift in alliance relationships occurs.

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<sup>9</sup> In weighing options for deployment of the MX Peacekeeper intercontinental ballistic missile in the 1970s and 80s, senior US officials confronted the growing vulnerability of fixed-point targets to a first-strike Soviet attack. One solution considered was to establish a series of widely spaced shelters—over 20 for each missile. In theory, the Soviets would have had to destroy all of the shelters to ensure the one missile shuttling between them would also be destroyed, exacting far too great a cost on the Soviet missile forces for such an attack to be profitable. Hence, the MX would be survivable. For a variety of reasons, this basing mode was never implemented.

<sup>10</sup> The concept of preferential defense is fairly straightforward. Since US and allied missile and air defense forces would know those forward bases that were being used by friendly militaries, they could be instructed to intercept only those missiles targeted on bases currently in use. As with any defense, there are some potential problem areas. First, one must assume that the enemy's intelligence is limited, and also that he does not possess the capability to conduct saturation attacks against all bases. Second, one must also assume that creating substantial numbers of bases is feasible. For example, it would likely be difficult to establish such a basing scheme in a country like Israel or Japan. Third, defenses designed to operate early in an enemy's attack phase (e.g., ballistic missile boost-phase intercept systems) cannot, at present, differentiate between those missiles targeted on bases in use and empty bases. In short, they cannot practice preferential defense. Fourth, there is likely to be a residual support structure required even at austere bases. Unless this support structure can be made mobile, erosion of base infrastructure support may occur under the weight of enemy attacks.

## EXTENDED-RANGE CAPABILITIES

A portion of the military capabilities resident at forward bases might be relocated to bases in the United States itself. This implies an increased reliance on military systems and forces with extended, even intercontinental range, such as long-range bomber forces or extended-distance electronic-strike. Other capabilities involving C4ISR, and perhaps strike, might be exported to space. The exporting of US military capabilities from their forward bases obviously implies a reduction of US forward-stationed forces, which could reduce the credibility of America's security guarantees to its allies.

## RAPID BASE DEVELOPMENT

Given the high level of geopolitical uncertainty and the growing military risk to forward-based forces, the United States might adopt a defense posture in which it waits until the appearance of a crisis or conflict before it identifies base locations and deploys substantial forces into a threatened region. This, arguably, was the approach followed by the United States at least through World War I and perhaps leading up to World War II as well. The potential advantages of assuming a wait-and-see posture are several. If alliances are fluid, or shifting, the United States would want to avoid investing heavily in developing bases to which it may not maintain long-term access or, worse still, have fall into the hands of its competitors. However, there are likely downsides to this scheme as well. The reduction in US forward presence may erode the credibility of American security guarantees. The US military would have to acquire the ability to develop forward bases, in whatever form (e.g., peripheral, distributed) very quickly.<sup>11</sup> This approach to basing would almost certainly increase the need for extended-range military systems whose capabilities could be brought to bear almost immediately, while rapid forward base development is occurring.

## NEXT STEPS

Transforming the US global basing structure will be a fundamental part of transforming the US military. It is no exaggeration to say that the shift in primary geopolitical focus from Europe to Asia, and the basing option mix selected, will exert a profound influence on the doctrine and force structure of America's armed forces and on the long-term military balance.

Determining the feasibility of basing alternatives should be an integral part of Service and Joint transformation concept studies, war games and field exercises. Efforts should be made to involve America's principal allies in the process of addressing this challenge. As other militaries begin to transform their basing structures in recognition of the growing vulnerability of large, soft, fixed facilities, the US military should seek opportunities to profit from their experience. Finally, the utility of American-owned bases outside the continental United States—such as those in Alaska, Hawaii and Guam—should be reviewed as part of a comprehensive study of the matter.

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<sup>11</sup> The United States has demonstrated something like this kind of capability in the past. For example, during World War II the rapid base development capabilities of America's Naval Construction Battalions (or SeaBees) supported its island-hopping campaigns in the Pacific Theater. The development of artificial harbors, called Mulberries, were important in sustaining the allied offensive in France after D-Day. During the Vietnam War the US military developed basing facilities in South Vietnam with remarkable speed and effectiveness.

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## XIV. FUNDING TRANSFORMATION AND MATCHING DEFENSE MEANS AND ENDS

Throughout this report, we have discussed a range of technologies, specific weapon systems, concepts of operation, and organizational changes that might prove key to the successful transformation of the US military over the next two decades. As a result of these advances and changes, the US military of 2020 might look very different from the military of today. Over the long term, implementing this kind of change would likely require a substantial, perhaps even dramatic, shift in the Defense Department's funding priorities.

However, the level of funding required to jump-start transformation efforts over the next six years, FY 2002–07 (the period that will be covered by the next FYDP), is relatively modest. This is because, over the next six years, transformation efforts will need to focus primarily on research, development of prototypes, and operational testing and experimentation. Decisions to move multiple new systems into full-scale development and large-scale production and fielding would, for the most part, probably not be made until around 2007. Thus, major increases or shifts in funding would probably not have to be made until towards the end of this decade, or possibly even later.

### TRANSFORMATION FUNDING WEDGE

In order to jump start DoD's transformation efforts, we recommend a package of initiatives with six-year costs of about \$30 billion. Most of this funding would be used for R&D, experimentation, transformation field exercises, and small-quantity buys of some of the promising new systems discussed elsewhere in this report. Specifically, we recommend that the following programs be provided funding increases. In all cases, the funding represents additions to currently planned funding levels for the FY 2002–07 period.<sup>12</sup>

- *Science and Technology Funding:* The Defense Department's R&D budget covers a wide range of functions and activities. The portion of the R&D budget that is widely viewed as being most critical to the discovery and development of new technologies promising major leaps in military capability is known as the Science and Technology budget. S&T funding consists of basic research, applied research and advanced technology development. Typically, S&T programs account for only about 20 percent of DoD's R&D budget. The later stages of R&D, especially engineering and manufacturing development, where the design of new weapon systems is finalized prior entering production, tend to be far more costly. As such, S&T programs represent an excellent investment if, as argued throughout this report, rapid technological advances are likely to be made over the next decade or two and the most

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<sup>12</sup> In order to enhance the usefulness of this report for the new administration, Congress and other policymakers, we use the FY 2002–07 period as the baseline for any recommended program additions or cuts, since this is the period that will be covered in the next FYDP. The baseline assumes that funding levels would be the same as those included in the Clinton Administration's last FYDP through FY 2005 (the last year covered by that FYDP). For FY 2006–07, it is assumed that funding would be held flat, in real terms, at the level projected for FY 2005.

serious threats to US security are likely to emerge over essentially this same period. Reflecting this view, we would add about **\$11 billion** to the current plan for S&T funding over the FY 2002–07 period. This would be sufficient to maintain S&T funding at about \$9 billion a year (FY 2001 dollars). This is equal to the enacted FY 2001 level, exceeds the amount that was spent on average over the past 15 years, and would raise funding over the next six years by 20 percent above currently planned levels. It is also some \$700 million a year more than was recommended in a May 1998 Defense Science Board Study.

- *Trident SSGN Conversions*: The Navy is currently trying to decide whether to convert the four Trident ballistic missile submarines otherwise scheduled for retirement to cruise-missile carrying boats. These conversions would cost some \$4.5 billion for all four boats if done in such a way as to be consistent with existing arms control treaties. Alternatively, if an agreement could be reached with Russia to allow the United States to convert the boats in a simpler way, the cost would be about \$2.4 billion. We would move ahead with the conversion of all four boats. To be conservative, it is assumed here that an agreement modifying treaty requirements will not be made—although an attempt to negotiate such a modification certainly should be made. Thus, the conversions are assumed to cost \$4.5 billion. In addition, perhaps another \$500 million would be need over the FY 2002–07 period to cover the O&S costs of these four boats, bring total six-year costs to about **\$5 billion**. This option would also ensure that sufficient funding would be available to refuel a number of Los Angeles class boats that would otherwise be retired—obviating the need, under current plans, for the Navy to choose between these refuelings and beginning conversion of the Trident submarines.
- *Streetfighter Ship*: We would provide **\$750 million** for the construction and operational testing of several different Streetfighter ship prototypes. Just what such a ship might look like is difficult to determine at this point, suggesting that it would be best to explore several options, including possibly multiple prototypes. Probably, however, such a ship would be much smaller than the DDG-51 or the planned DD-21 destroyer. Thus it should be possible to conduct substantial R&D and prototyping for \$750 million—less than the price of a single DDG-51 and about the same as the unit procurement cost goal for the DD-21.
- *Joint Mobile Offshore Base*: The cost of constructing a full MOB, with platforms totaling two kilometers in length, has been estimated at from \$5 billion to \$8 billion. Rather than funding an entire MOB, we would provide **\$1.5 billion** to fund the development and construction of a single module, to be used for operational testing. Consideration also should be given to employing JMOB surrogates as part of Navy Fleet Battle Exercises and in joint exercises involving power-projection operations against an anti-access/area-denial threat. Candidate surrogates could include the Navy carrier *Constellation*, due to be decommissioned in FY 2002, and a modified offshore drilling platform.
- *Unmanned Aerial Vehicles*: We would add **\$3.5 billion** to planned funding of a variety of UAV programs. This would effectively double DoD funding for UAV programs. The \$3.5 billion would include about \$500 million to accelerate the development of the Unmanned Combat Air Vehicle program, with the goal of fielding a single squadron of prototypeUCAVs by FY 2005. This squadron would be used to operationally test the system and

would have a limited capability for use in wartime. Another \$1.3 billion would be set aside to be used for EMD, assuming operational testing confirms the usefulness of the system. The remaining \$1.7 billion would be used to accelerate the development and fielding of UAVs to be used for a variety of other roles, such as reconnaissance and electronic warfare.

- *Discoverer II Space-Based Radar*: The development and production of two prototype space-based radar satellites would cost some **\$600 million**. Assuming no significant technological delays, these satellites would be launched and their performance tested over the FY 2003–04 period. We would provide the required funding for this effort. Additional funding would be required during the latter half of the FYDP if these tests prove effective and the decision is made to procure a full constellation of these satellites.
- *Army Initiatives*: We propose to add **\$1.5 billion** to provide additional funding for the HIMARS lightweight missile artillery system and a restart of ATACMS Block IIA extended-range missiles. Within our proposed \$11 billion increase in the science and technology accounts is additional support for accelerated development of the Future Combat System, broader and more rapid exploitation of various applications of military robotics and advanced development funds for more survivable, extended-range air mobility aircraft.
- *Operational Experimentation*: We would provide about **\$7 billion** over the next six years to create or enhance a handful of sites to be used to train and experiment with new kinds of forces and operational concepts and to do so against new kinds of threats. These would include, for example, a Joint Anti-Access/Area-Denial National Training Center and a Joint Urban Warfare Training Center, and would include the formation of a Joint Standing Opposing Force designed to resemble the kinds of asymmetrical threats US forces are likely to face in the future.

Relative to the overall level of funding projected for defense over the coming six years, the cost of this package of transformation initiatives is extremely low. At roughly \$30 billion over the FY 2002–07 period, the cost of these initiatives equates to only about 1.5 percent of the projected defense topline over these years. Thus, if the Department of Defense did not already suffer from a significant plans-funding mismatch, adding this transformation package would be relatively easy. It would require making only a modest increase in the defense topline or cutting back on a select number of force structure elements, activities or programs.

For example, canceling the JSF and the Crusader artillery system, and scaling back on planned buys of the F-22, and making some relatively modest reductions in force structure—e.g., cutting one Army division, or one or two aircraft carrier battle groups, or three Air Force fighter wings—would probably suffice to achieve the \$30 billion in needed savings. This savings estimate assumes that in place of the forgone JSFs, Crusaders and F-22s, the Services would buy, respectively, new block 60 F-16s and F-18E/F fighters, artillery systems such as the British AS-90 or German PzH 2000, and new F-15E fighters.

The problem is that, as noted earlier, the cost of the Defense Department’s plans over the FY 2002–07 period is already likely to exceed projected funding levels by a total of some \$120 billion, due primarily to probable growth in both weapons acquisition and O&S costs. *Thus,*

*fixing the current defense plan will require not simply coming up with \$30 billion in additional topline or offsetting cuts, but a total of \$150 billion in more funding or cuts. It is important to recognize, however, that four-fifths of this funding boost or program cut is required to eliminate the existing plans-funding mismatch and will have to be made whether or not the package of transformation initiatives outlined above is pursued.*

The ideal way to eliminate this mismatch between the likely cost and projected funding for the current defense plan would be to do so through improvements in the way the Defense Department does business. As such, efficiency savings should be vigorously pursued. In particular, the Defense Department should fully implement existing plans to open up some 200,000 infrastructure-related jobs currently performed by civilian DoD employees to competition from the private sector. The new administration and Congress should also move forward with additional base closures. However, because of uncertainty about their effectiveness, and the limited success of past efforts, the Defense Department should not *depend* on efficiency savings to make its plans affordable. This leaves essentially three ways to eliminate the existing mismatch: add more funding to defense; scale back the Defense Department's plans; or adopt a combination of these two approaches.

Given recent, and growing, projections that the federal government will run significant budget surpluses over the next decade and beyond, the defense budget could be increased. And a real increase of even one or two percent a year would be likely sufficient to pay for the current defense plan, plus the proposed transformation package.

However, both major political parties appear to have other higher priorities. A consensus has emerged that the portion of the surplus generated by the Social Security trust fund should not be used to finance new spending or tax cuts, and instead should be used to pay down the debt. This effectively reduces the size of the available surpluses projected by the Congressional Budget Office (CBO) from about \$4.6 trillion over ten years to less than \$2.2 trillion.<sup>13</sup> In addition, a consensus appears to be emerging to fence off the portion of the surplus generated by the Medicare Hospital Insurance trust fund as well. This would leave a projected surplus of some \$1.8 trillion. Furthermore, another \$200 billion or so would be needed over the next decade to cover the costs of simply continuing current policies in areas such as farm aid and certain tax credits (which are otherwise due to expire). This means that the only some \$1.6 trillion may be available for new spending or tax cuts. The amount available would fall to \$1.3 trillion if the more conservative projections of the Office of Management and Budget (OMB) turn out to be correct. Against a surplus of this magnitude, a broad range of costly new initiatives have been proposed. These include large tax cuts, expansion or reform entitlement programs, and increases for education, health research and other discretionary domestic programs. Given all of these other priorities, sustaining a real increase in funding for defense of even one percent a year might be difficult.

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<sup>13</sup> These figures are based on CBO's July 2000 surplus estimates.

Solving this \$150 billion problem entirely through program cuts alone or force structure cuts alone would also be difficult. In addition to canceling the JSF and the Crusader and scaling back the F-22 program, for example, it would probably be necessary to cut the planned force structure by some 15 percent. This might include, for example, cutting two Army divisions, two carrier battle groups, two amphibious ready groups, a Marine Corps regiment, and three Air Force tactical fighter wings.

Fortunately, as discussed earlier in this report, cuts of this magnitude would still leave the United States with a very potent military and result in only a modest increase in near-term risk. And the investment of \$30 billion for various transformation initiatives would likely greatly improve the US military's ability to meet the very different and far more serious challenges likely to emerge over the long term.





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## XV. CONCLUSIONS

### GREAT CHALLENGES—AND A GREAT OPPORTUNITY

The United States enters the new century as by far the world's predominant military power. The opportunity exists to secure the blessings of a long peace. It is an opportunity that occurs rarely in history.

However, realizing such a desirable state of affairs will not be easy. America's military predominance comes during a time of great turbulence and high uncertainty. The nation does not know when the next major challenge to its security will materialize, the form the challenge will assume, or who will present it. There also is considerable uncertainty over the military implications of the rapid advances in technology that comprise what some have termed the Information Revolution. Nor is there a consensus on when the pace of technological progression will begin to subside.

Moreover, while the United States' currently enjoys a level of military dominance that is arguably unsurpassed in modern history, a number of unfavorable trends are at work that seem likely to reduce this advantage, perhaps substantially. The shifting sands of the international system have, over the last decade, marked some erosion in the US Cold War alliance structure. Increasingly terms such as "ad hoc coalitions" and "coalitions of the willing" are used to describe efforts to bring states together to oppose aggression in its various forms.

At the same time we may be witnessing the rise, or recovery, of great regional powers whose capacity to generate military capability, should they choose to do so, will be far more formidable than that of the rogue power threats that characterized the last decade. While these great powers need not become competitors of the United States, maintaining favorable military balances in key regions, and in key functional areas (e.g., space, information operations) seem quite likely to become more difficult than in recent years. Additionally, the growing potential of various non-state actors—transnational crime organizations, separatist movements, terrorist organizations, etc.—to generate military capability, far in excess of what has traditionally been available to them, seems certain to complicate further US efforts to maintain the stability that characterizes a long peace.

Atop these major changes in the geopolitical environment must be added the implications of an emerging military revolution, which promises to alter, in some cases fundamentally, the character of how military operations are conducted and how wars are won. As this occurs, the measures of what is required to maintain military superiority will change as well. Thus, if the United States wants to sustain its current military advantages, which represent one of the principal cornerstones of global stability, it must do two things. First, it must identify the key military competitions that will emerge out of this period of military revolution. Second, it must transform the American military so that it is optimized to prevail in these new competitions, rather than on those that are passing from the scene.

This report has outlined some of the new challenges that will quite likely surface over the next decade or so. Indeed, some have already materialized. Anti-access and area-denial threats are already present, albeit in their early forms. The need to preserve access to space assets, and to control space in the event of conflict, are challenges that will soon confront US defense planners. Nor can the need to develop defenses against potentially new forms of commerce raiding on the high seas be discounted. The Defense Department cannot ignore the growing threat to the homeland, in the form of ballistic and cruise missiles armed with nuclear weapons, the covert introduction and employment of chemical and biological agents, or information warfare conducted against the US economic infrastructure. These emerging competitions, and others, are a far cry from the military competitions that dominated US defense planning only a few short years ago. Unfortunately, the Defense Department's 1997 Quadrennial Defense Review did not, in any substantial way, reorient the defense program to reflect the changes now underway.

In summary, our diagnosis finds the United States has a great opportunity to secure a long peace, but realizing this opportunity will almost certainly require a transformation of the American military.

## A TRANSFORMATION STRATEGY—ONE APPROACH

If the reader finds this report's diagnosis of the emerging security environment persuasive, and the goal of a long peace worth pursuing, there remains the matter of strategy. If history is any guide, there seem to be some enduring elements that characterize military organizations that have successfully transformed themselves. These elements of transformation—a vision of the emerging character of military competitions; an understanding of new challenges at the operational level of warfare; a hands-on approach by the organization's senior leaders; extended tenure for key individuals leading critical transformation efforts; vigorous field exercises linked to wargaming and progress being made in the defense industrial base; a procurement strategy that emphasizes creating options and compressing the time it takes to exercise them; etc.—should be part of any strategy that follows from our diagnosis.

Within this guiding framework, there are a number of plausible paths one might pursue with respect to the details of transformation. For example, although it is clear from our diagnosis of the emerging security environment that greater emphasis needs to be placed on developing future military capability relative to sustaining current capability, reasonable people can differ over the precise details as to which capabilities are reduced, and by how much. Similarly, while it is clear that the Defense Department's modernization plans require substantial modification, the precise mix of new program initiatives (and program cuts and reductions) leaves some room for honest disagreement as well.

This report explores one transformation path, which the authors believe is superior to the path being pursued in the current defense program, as outlined in the QDR of 1997. Our approach takes into account not only the changing geopolitical and military-technical environment, but also the fiscal limitations under which the Defense Department must operate. This latter point cannot be overemphasized. This report does not wish away the current mismatch between the defense program and projected budget estimates. Nor does it assume implausible increases in defense spending to cover the shortfall. Nor does it conjure up ever-increasing savings from

various efficiencies and management reform initiatives which, while always worth pursuing, have consistently failed to yield the savings forecasted.

## THE NEED TO BEGIN NOW

The United States today has before it a great, and rare, opportunity to secure not only peace in our time, but a long peace that might endure for generations. It is also a fleeting opportunity. America's advantages in economic might and technological sophistication seem likely to decline as great regional powers come into their own and technology continues its rapid diffusion. Allies that once clung tightly to the United States in confronting a common global threat now must be persuaded to join short-lived coalitions. Yet America will need its allies more, as an increasing share of the US defense budget will almost certainly be allocated to address the growing threat to the American homeland, leaving fewer resources, and forces, to meet overseas commitments. Finally, a military revolution threatens to redefine what matters most in calculating military power by enabling new forms of military competition.

This argues for developing and implementing a defense strategy that can enable the United States to realize the goal of securing a long peace, with the transformation of the American military as the centerpiece of that strategy. Transformation, however, takes considerable time—at least a decade and often longer. Hence it is no exaggeration to say that such a strategy must be put into place soon, while America's opportunity to shape the future security environment and achieve its security objectives is at its greatest.



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## XVI. ACRONYMS

|        |   |
|--------|---|
| AAAV   | Advanced Amphibious Assault Vehicle   |
| ABM    | Anti-Ballistic Missile  |
| ACR    | Armored Cavalry Regiment  |
| AEF    | Air Expeditionary Force   |
| AGS    | Advance Gun System  |
| ARG    | Amphibious Ready Group  |
| ASW    | Anti-Submarine Warfare  |
| ATACMS | Army Tactical Missile System  |
| ATT    | Advanced Technology Transport   |
| AWACS  | Airborne Warning And Control System   |
| BCT    | Brigade Combat Team   |
| C4ISR  | Command, Control, Communications, Computers, Intelligence, Surveillance, And Reconnaissance |
| CBO    | Congressional Budget Office   |
| CBR    | Congressional Budget Resolution   |
| CEC    | Cooperative Engagement Capability   |
| CINC   | Commander in Chief  |
| COTS   | Commercial Off The Shelf  |
| CVBG   | Carrier Battle Group  |
| DoD    | Department of Defense   |

|        |   |
|--------|---|
| EMD    | Engineering and Manufacturing Development     |
| EMP    | ElectroMagnetic Pulse                         |
| ESB    | Enhanced Separate Brigades                    |
| EU     | European Union                                |
| FAR    | Federal Acquisitions Regulations              |
| FBE    | Fleet Battle Experiment                       |
| FCS    | Future Combat System                          |
| FY     | Fiscal Year                                   |
| FYDP   | Future Years Defense Program                  |
| GAO    | Government Accounting Office                  |
| HD/LD  | High Demand/Low Density                       |
| HIMARS | High Mobility Artillery Rocket System         |
| HPM    | High-Power Microwave                          |
| ICBM   | InterContinental Ballistic Missile            |
| IR&D   | Independent Research & Development            |
| IW     | Information Warfare                           |
| JCS    | Joint Chiefs of Staff                         |
| JOF    | Joint Opposing Force                          |
| JSF    | Joint Strike Fighter                          |
| JSTARS | Joint Surveillance/Target Attack Radar System |
| LNG    | Liquid Natural Gas                            |
| MEB    | Marine Expeditionary Brigade                  |

|       |   |
|-------|---|
| JMOB  | Joint Mobile Offshore Base                  |
| MTI   | Moving Target Indicator                     |
| MTW   | Major Theater War                           |
| MWB   | Medium Weight Brigade                       |
| NATO  | North Atlantic Treaty Organization          |
| NMD   | National Missile Defense                    |
| NPT   | Non-Proliferation Treaty                    |
| NSSN  | New Attack Submarine                        |
| O&M   | Operations & Maintenance                    |
| O&S   | Operations & Support                        |
| OMB   | Office of Management and Budget             |
| OPFOR | Opposing Force                              |
| OSD   | Office of the Secretary of Defense          |
| PGMs  | Precision-Guided Munitions                  |
| QDR   | Quadrennial Defense Review                  |
| QTR   | Quad Tilt Rotor Aircraft                    |
| R&D   | Research & Development                      |
| RDT&E | Research, Development, Testing & Evaluation |
| RMA   | Revolution in Military Affairs              |
| S&T   | Science & Technology                        |
| SAG   | Surface Action Group                        |
| SFG   | Special Force Group                         |

|       |                                 |
|-------|---------------------------------|
| SOF   | Special Operations Forces       |
| SSBN  | ballistic missile submarine     |
| SSGN  | cruise missile submarines       |
| SSN   | fast attack submarine           |
| START | Strategic Arms Reduction Treaty |
| TLAM  | Tomahawk Land-Attack Missile    |
| TMD   | Theater Missile Defense         |
| UAV   | Unmanned Aerial Vehicle         |
| UCAV  | Unmanned Combat Aerial Vehicle  |
| UUV   | Unmanned Underwater Vehicle     |
| VSTOL | Very Short Take-Off/Landing     |
| WMD   | Weapons of Mass Destruction     |