STRATEGY FOR THE LONG HAUL

CSBA

Defense Investment Strategies in an Uncertain World

BY ANDREW F. KREPINEVICH

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DEFENSE INVESTMENT STRATEGIES IN AN UNCERTAIN WORLD

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It is widely recognized that US armed forces are increasingly engaged in irregular warfare operations such as peace-keeping and anti-insurgency rather than traditional large-scale combat operations, and that this trend will continue in the foreseeable future. It follows that weapons, training, and strategy should be reoriented accordingly. However, during times of war, nations are confronted with a difficult choice in regards to defense investing: should the current threat be addressed or should investments go toward possible future threats? How can planners make defense investment decisions in order to best prepare for an unknown future?

EXECUTIVE SUMMARY

DEFENSE INVESTMENT STRATEGIES IN AN UNCERTAIN WORLD

This report addresses the critical issue of allocating resources to deal with current and future discontinuities in the security environment. For the Defense Department, strategy is fundamentally about making choices as to how limited resources can best be used to provide for the nation's security. One of the most difficult choices is between apportioning resources to deal with current challenges confronting the military, or devoting them instead to creating novel or even revolutionary military capabilities that address emerging challenges. To help strike the appropriate balance between these two options, this report provides a framework for thinking about investment strategies at a time when the United States is at war, and facing the need to transform its military owing to the likelihood of significant shifts in the character of the military competition. The first section of the report addresses how the competitive environment has dramatically changed since the Cold War's end, and notes how the Defense Department's existing investment strategy is ill equipped to address these changes. The report's second section explores a number of investment strategies that may be profitably pursued under conditions of existing or emerging discontinuities in the character of conflict.

AN ERA OF DISCONTINUOUS CHANGE

During periods of discontinuous change, defense planners are confronted with the need to affect *large-scale* changes in military capabilities, doctrine and structure, i.e., to transform the military. This need to transform must also be balanced with the need to maintain sufficient capabilities to address immediate challenges to national security. Transformation is often a difficult process, however, particularly when the nation is at war. At times like this, there is an understandable view on the part of senior civilian and military leaders alike that the Defense Department's primary focus

must be on investing in what is needed to support current operations. Yet it would be imprudent to ignore emerging challenges.

Rapidly advancing technologies and an array of adversaries are combining to present very different kinds of challenges to US security. Prior to 9/11, it was difficult to state with conviction *what* the next major threat to US security might be, when it would manifest itself, and *how* it would be advanced. Recent events have done much to reduce this uncertainty. What have emerged are three new and very different military challenges. The first and most obvious long-term challenge is that posed by radical Islamists and other militant nonstate entities, who are waging a form of modern insurgency warfare that exploits a range of technologies and capabilities that were unavailable to insurgent movements a generation ago. The second major and enduring challenge to US security that has crystallized in recent years is the spread of nuclear weapons to unstable and/or hostile states. The third and most traditional major challenge the United States confronts is the rise of China to great regional power status and, perhaps over time, to global power status.

These challenges are not only different from that posed by the Soviet Union during the Cold War, they also vary widely from the major security threats confronted by the United States during the late 20th century. Unfortunately, today's Defense Department planners have little experience in crafting investment strategies during periods of military discontinuity. Rather, current planning is still very much informed by the department's four-decade long Cold War experience, which produced an approach to investment that emphasized purchasing military systems in large quantities to maximize economies of scale.

NEW PLANNING ISSUES

The three enduring challenges mentioned above, while providing some clarity for those crafting investment strategies, also induce considerable uncertainty into the planning process, as it is far from clear *how* challengers will apply existing and emerging means of warfare to achieve their goals. Thus the Department's investment profile, relative to the Cold War era, must cover a wider range of contingencies, while also accounting for the prospect of additional discontinuities.

Given these considerations, continuing its existing approach to investments, even with the ongoing war, would almost certainly be a mistake. In an era of discontinuous change, the US military's ability to adapt to, or better still, *anticipate* such changes will exert considerable influence on its competitive position. Discontinuities can be viewed as inflection points, or major shifts in the military competition. They can be stimulated by several factors, principal among them a combination of new military capabilities, warfighting concepts and organizational structures that together bring about a military revolution. Discontinuities are often difficult to predict, both in terms of *when* they will occur and *how* they will influence the character of warfare. Consequently, during periods of great military discontinuity, or military revolution,

the level of risk and uncertainty is considerably higher than during periods of evolutionary change. Thus militaries can incur severe penalties if they fail to transform, or if they pursue the wrong transformation path.

What factors contribute to successful investing in periods of discontinuity? One is the ability to identify those capabilities that stand to lose much of their value once the major shift occurs in the competitive environment, and those that will grow rapidly in value. This is not easy, as the exact time and form of discontinuities are difficult to predict with confidence. Another key is the ability to minimize the costs imposed on US defense investments by risk and uncertainty. These costs are incurred because an investment strategy simply cannot take into account all the myriad factors that will shape the future competitive environment. There are, however, ways to increase the odds of investing wisely. Investors, for example, typically develop strategies to hedge against risk and uncertainty, so they are able to compete at least at minimal acceptable effectiveness levels across the range of plausible futures.

Most importantly, investment strategists must avoid the pitfall of using uncertainty as a rationale to avoid major change. The temptation to adopt a "wait-and-see" attitude can be great. Decision makers can fall prey to the illusion that, by doing so, they are preserving their options. But this is a chimera. Choices *are* being made. Resources *are* being allocated. Finally, a critical component to any investment strategy is a clear statement by the DoD leadership describing its vision of the future competitive environment, the objectives to be achieved, and how the Department's investment strategy will enable those objectives to be met. In military terms, this means investment planners must have some understanding of both the key strategic and operational challenges confronted by the armed forces, as well as the point-of-departure operational concepts for dealing with these challenges. Absent a compelling vision of what discontinuities might emerge and at least some first-order assessment of how they might be addressed, there is a strong bias toward continuing down the current investment path.

STRATEGIC INVESTMENT ELEMENTS

Building on the components of a successful investment strategy discussed above, there are a number of specific tools that the Department of Defense could employ in its efforts to best respond to the changing security environment in which the United States now finds itself. These tools are intended to place the US in the best position possible by shaping its own investments and by influencing the investments of potential adversaries.

Some specific investment techniques discussed in this report include: time-based competition; hedging; "wildcatting;" cost-imposing (or competitive) strategies; exploiting the factors of complexity and diversity made possible by the United States' enduring advantages in both scale of resources and technical sophistication; "black" programs; strategic outsourcing; and the Department's global posture.


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INTRODUCTION

In the modern era, military competitions rarely "stand still" for long. To be sure, the pernicious effects of an investment strategy overly dominated by near-term considerations can be mitigated somewhat if the character, scale and scope of future security challenges are similar to those for which the current military has been organized, trained and equipped. But the opposite is also true. If the current and projected competitive environments are characterized by discontinuous or disruptive shifts in the military competition, the deleterious effects of a resource allocation strategy that emphasizes forces and capabilities optimized for today's competitive environment are almost certain to be compounded. Unfortunately for the United States, it is the latter case that holds today.

For the Defense Department, a key aspect of strategy involves making choices as to how limited resources can best be used to provide for the nation's security. One of the most difficult choices involves the tradeoff between apportioning resources to deal with current challenges confronting the military, or devoting them instead to creating novel or even revolutionary military capabilities that address emerging challenges or exploit new opportunities. This choice is made all the more difficult during periods of discontinuous change,[1] such as we are now experiencing. In this respect, the concept of "investment" can be viewed as sacrificing current consumption (i.e., buying more capital stock currently in production, such as the F/A-18E/F, or maintaining the current force structure) in order to acquire a greater military advantage at some future point in time (e.g., by updating the national training infrastructure; improving

A key aspect of strategy involves making choices as to how limited resources can best be used to provide for the nation's security.

[1] As used in this paper, the term "discontinuity" refers to a major or "disruptive" shift in the character of military competitions. The terms "military revolution" and "revolution in military affairs" have also been used in describing such discontinuities. "Transformation," as used here, refers to the *process* by which a military organization affects large-scale changes in its capabilities, doctrine, and organization either in response to a discontinuity, or to position itself to deal with, or exploit, an emerging discontinuity. The former phenomenon can be termed "reactive transformation," and the latter "anticipatory transformation."

military education; or increasing funding for research and development—to include developing the industrial capacity for new systems and capabilities). All things being equal, the natural—one could easily say "human"—tendency is to favor the "bird in the hand": developing military capability now to address today's threats. Defense secretaries and other senior defense officials are typically judged for how things go during their tenure in office, and not on what transpires on their successors' watch. This propensity to emphasize immediate returns on investment is heightened further when the country is at war, as is currently the case.[2]

The Defense Department's senior leadership appears to recognize the problem. In the 2006 Quadrennial Defense Review (QDR), the Secretary of Defense declared that, while the US military dominated "traditional" (i.e., conventional) warfare, very different kinds of challenges have emerged in the form of "irregular" and "catastrophic" threats to US security, while other "disruptive" threats are on the horizon.[3] The implication is that the Defense Department must continue transforming the military by shifting the relative weight of defense resource allocations away from "traditional" areas of military competition and toward those that address recent (i.e., "irregular" and "catastrophic") and longer term (i.e., "disruptive") discontinuities in the competition. The former can be termed "reactive transformation," in that it involves major shifts in investment priorities only in the wake of a new threat. The latter can be termed "anticipatory transformation," in that the US military attempts to "transform" quickly enough to counter a threat before it materializes.

This report addresses the challenge of providing resources to deal with current and prospective discontinuities in the competitive environment (i.e., both reactive and anticipatory transformation), whether those discontinuities are induced by adversaries of the United States or the United States itself. Those looking for a detailed, prescriptive investment strategy are bound to be disappointed. The paper is also intended to be diagnostic rather than prescriptive. That is to say, the focus is on providing a framework for thinking about investment strategies at a time when the United States is at war, while also facing the need to transform its military owing to

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[2] A case in point is the Mine Resistant Ambush Protected vehicle, or MRAP. The supporters of MRAP argue that it is badly needed to help protect US troops in Iraq from enemy improvised explosive devices, or IEDs. The Defense Department has made procuring some 15,000 MRAPs at a cost of over $20 billion a high priority, even though the utility of these vehicles in future contingencies has yet to be determined. See "Cartwright Memo on 'Army Future Force Mix for Ground Vehicles'," cited at http://www.insidedefense.com, accessed on October 2, 2007. In a memo to Army Vice Chief of Staff Gen. Richard Cody, Marine Corps Gen. James Cartwright, vice chairman of the Joint Chiefs of Staff, directed Cody to articulate his Service's overarching strategy for modernizing and sustaining its wheeled-vehicle fleet over the next dozen years, a vision that should address long-term plans for the MRAPs the Service seeks to acquire. For an extended discussion of the MRAP issue, see Andrew F. Krepinevich and Dakota Wood, *Of IEDs and MRAPs: Force Protection in Complex Irregular Operations* (Washington, DC: Center for Strategic and Budgetary Assessments, 2007).

[3] Department of Defense, *2006 Quadrennial Defense Review Report* (Washington, DC: Department of Defense, 2006), p. 19.

the likelihood of significant shifts in the character of the military competition.[4] This framework provides the reader with investment concepts or "tools" for use in crafting an investment strategy.

The discussion is organized as follows: the first section briefly addresses how the competitive environment has dramatically changed since the Cold War's end. Three new major and enduring challenges are presented in summary form. These challenges should animate and inform much of the Defense Department's investment strategy in the coming years. But that is not the only problem that defense strategists confront. Owing to the dynamic nature of today's geopolitical situation and the rapid advances in military-related technologies, they must also be prepared for further discontinuities in the conflict environment. The report goes on to argue that the Department's current investment strategy is attuned to an era of evolutionary change in the military competition and relatively low uncertainty regarding the character of the threats confronted. What is needed, instead, is an investment strategy more in tune with the United States' current circumstances, which are defined by relatively high risk and uncertainty, and the prospect of further discontinuous change.

The report's second section explores a number of investment strategies that may be profitably pursued under conditions of existing or emerging discontinuities in the character of conflict. It begins with a discussion of risk and uncertainty, followed by a discourse on opportunity costs. The presentation next turns to specific investment techniques, to include: time-based competition; hedging; "wildcatting;" cost-imposing (or competitive) strategies; exploiting the factors of complexity and diversity made possible by the United States' enduring advantages in both scale of resources and technical sophistication; "black" programs; strategic outsourcing; and the Department's global posture. The report's third and final section offers a brief summary of findings and some suggestions on how these investment strategies might best be implemented.

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[4] As will be elaborated upon presently, these discontinuities are stimulated by changes in the type of threats posed to US security (e.g., radical Islamist insurgents; minor powers armed with nuclear weapons) and the emergence of new military capabilities (e.g., precision attack; information warfare).


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A MATTER OF TIMING AND BALANCE

Defense investment strategies are a matter of timing and balance, as well as resources. The Defense Department has four major investment categories: personnel, operations and maintenance (O&M), procurement, and research and development (R&D). Some investments, such as personnel funding that pays the salaries of service members, and funding to support current operations and maintain equipment, realize an immediate payoff in the form of sustaining the near-term readiness of the existing force structure. Other investments, like those associated with procurement, have a longer-term payoff, as new equipment (a new fighter plane, for example) will provide a return in the form of military capability for a number of years. Research and development provide no immediate payoff, as they involve investing in new capabilities that may take a decade or longer to yield a new (and, hopefully, greatly enhanced) military capability. Defense planners must strike a balance between investments that offer near-term capability with those that promise a payoff at some point over an extended period of time. Simply put: How much risk should be accepted now to reduce risk later? How much of our investment "seed corn" can be diverted to reduce the dangers we confront at this moment? This is true for both periods of evolutionary and discontinuous change.

How much risk should be accepted now to reduce risk later?

The pressures to address immediate challenges to national security are both real and valid. Defense Secretary Robert Gates undoubtely felt these pressures when he observed "I have noticed too much of a tendency towards what might be called 'Next-War-itis'—the propensity of much of the defense establishment to be in favor of what might be needed in a future conflict." While Secretary Gates is right to address the importance of the trade-offs that exist between the capabilities needed to win today's wars and meet tomorrow's challenges, it is far from clear that his conclusion that

"Overall, the kinds of capabilities we will most likely need in the years ahead will often resemble the kinds of capabilities we need today" stands up to close scutiny.[5]

During periods of existing or anticipated *discontinuous* change, defense planners are also confronted with the need to affect *large-scale* changes in military capabilities, doctrine and structure, i.e., to transform the military. The need to transform must be balanced with the need to maintain sufficient capabilities to address immediate challenges to national security.

The lower the danger posed by immediate or near-term challenges, existing or anticipated, the easier it is to emphasize investing in capabilities that will pay off over the longer-term, and vice versa. In this regard, the low priority accorded to transformation during the 1990s, a period in which the threat to US security was lower than at any time in the previous half century, can be seen as a lost opportunity, especially since the need for transformation was clear to many defense experts.[6]

The Defense Department finds transformation a far more difficult proposition when the nation is at war.

The Defense Department finds transformation a far more difficult proposition under current circumstances, when the nation is at war. The problem is further complicated by the fact that the Defense Department was generally underfunded during the 1990s, even while the military found itself conducting an increasing number of operations. Moreover, defense modernization was given especially short shrift during this period, as the Pentagon was directed to take a "procurement holiday." At times like this, there is an understandable view on the part of senior civilian and military leaders alike that the Department's primary (and perhaps overwhelming) focus must be on investing in what is needed to support current operations.[7] Yet it would be imprudent to ignore emerging challenges since, in some instances, they will be quite different in form, scale, and duration from those that dominate the US military's attention today. Moreover, new military capabilities often take the better part of a decade or more to be fielded. Once fielded, major capital stock items (e.g., warships; tanks; aircraft) often remain in service for decades. Thus, Defense Department strategists must also consider how the capabilities generated by today's investments will fare in the contingencies the US military will confront in the future.

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[5] Accessed at http://www.defenselink.mil/speeches/speech.aspx?speechid=1240. Accessed on June 3, 2008. It is also worth noting that Secretary Gates candidly stated that he wrestles with the problem of how to balance the need to win the current war with the need to insure the country's long-term security. ("Much of what we are talking about is a matter of balancing risk: today's demands versus tomorrow's contingencies; irregular and asymmetric threats versus conventional threats".)

[6] For example, during the 1990s the Office of Net Assessment, (Office of the Secretary of Defense); the National Defense Panel; the Hart-Rudman Commission; and several senior military leaders advocated some form of military transformation. The Office of Net Assessment produced two assessments on the emerging military revolution, while the National Defense Panel titled its report "Transforming Defense."

[7] This sentiment is particularly evident in the Army, the Service most heavily taxed by the wars in Afghanistan and Iraq. During the 1990s, however, the Air Force also was stressed owing to combat operations in the Balkans and in northern and southern Iraq (Operations Northern Watch and Southern Watch), as was the Navy, owing to significantly higher steaming hours incurred as a consequence of deploying substantially more ships to the Persian Gulf than before the First Gulf War.

If the Defense Department could confidently conclude that emerging threats would be little more than a linear extrapolation of the threats it confronts today, it might be tempted to conclude that, given the US military's current dominance, simply fielding a better version of today's military would be appropriate. But this is not the case, for three reasons:

- FIRST, the US military is already engaged in reactive transformation efforts as a consequence of the discontinuity induced by the attacks on New York and Washington in September 2001 and the ongoing modern insurgencies being waged by radical Islamists in Afghanistan and Iraq;
- SECOND, rapidly advancing technologies, especially in the areas of information, communications, and computation; the biosciences; cognitive sciences; robotics; nanotechnology and directed energy offer the prospect of greatly improved military capabilities, even in the absence of a discontinuous shift in the threat environment; and
- THIRD, there is strong reason to believe that, owing to key geopolitical and military-technical trends, the threat environment will experience additional discontinuities over the next two decades, the planning horizon for Department of Defense (DoD) investment strategies.

Unfortunately, today's Defense Department planners have little experience in crafting investment strategies during periods of military discontinuity.

Unfortunately, today's Defense Department planners have little experience in crafting investment strategies during periods of military discontinuity. Rather, planning remains very much informed by the department's four-decade long Cold War experience. For most of this period the United States confronted a clear enemy, the Soviet Union, in a generally evolutionary conflict environment. While the competitive environment was not static and technology did advance, the rate of change was not comparable to recent experience or the anticipated rate of future change. Cold War era investment strategies were developed under conditions of relatively high certainty, both in terms of the identity of the threat and the form it would take. The Soviet threat was formidable, dwarfing all others. Thus DoD investment planning focused overwhelmingly on this immediate threat, rather than emphasizing potential opportunities to shape the competition or anticipating radical shifts in the competitive environment. Finally, as shown in Figure 1, investments centered primarily around conventional forces oriented on the form of warfare that came into dominance in the late 1930s and early 1940s with the advent of *blitzkrieg* operations, and on the shift in naval warfare from the battleship battle line to the fast carrier task force. Relatively

little investment was oriented on forces specifically designed for unconventional or nuclear warfare.[8]

The Cold War competitive environment produced in the Department an approach to investment that might be termed the "Costco effect."[9] New military systems were bought in large quantities to maximize economies of scale (i.e., to minimize unit cost). This generally made sense as improvements in capabilities were evolutionary. For example, the Army's Sherman and Patton tanks were succeeded by the M60 and, later, the Abrams tanks. Each tank represented a significant, but not revolutionary, improvement over its predecessor. Moreover, it was assumed, quite reasonably for many years, that the principal locations of military operations (e.g., Western Europe; Northeast Asia) would remain the same, that the enemy would remain the same, and that the enemy would pursue in-kind improvements to his military capabilities.

This type of thinking persisted beyond the Soviet Union's collapse. Defense Department planners in the immediate post-Cold War era of the 1990s operated on a set of flawed assumptions regarding the character of future conflict. Among these critical assumptions were that future conflict would be dominated by conventional war; that future adversaries would compete along the same lines as Iraq had in the First Gulf War; that nuclear proliferation would not occur; and that conflicts would be relatively brief in duration. This left the Defense Department, despite its enormous advantage in resources and technology, relatively ill-prepared for the challenges that would confront the country in the first decade of the new century.

These assumptions, however, no longer hold. New rapidly advancing technologies and an array of adversaries are combining to present very different kinds of

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[8] A crude (one might say, "*very* crude") measure of investment priorities during the Cold War era, compared with the post-Cold War period and the post-9/11 period, is to examine investments in general purpose forces, nuclear forces, and special operations forces (which are typically associated with unconventional operations). This yields the following:

	"Cold War" 1946–1989	Post-War 1990–2001	Current Fiscal Year 2008
Conventional	72%	83%	93%
Nuclear	27%	14%	4%
Special Operations	2%	3%	4%
Total *(Totals may not add to 100% due to rounding)*	100%	100%	100%

Again, this metric is rather crude, particularly since each of these forces is somewhat fungible (e.g., strategic bombers can be configured to provide fire support for Special Operations Forces; SOF covert raids can disable enemy nuclear strike elements, etc.). Nevertheless, the data do provide a first-cut perspective on the rather remarkable continuity of defense investments in major program areas across very different eras.

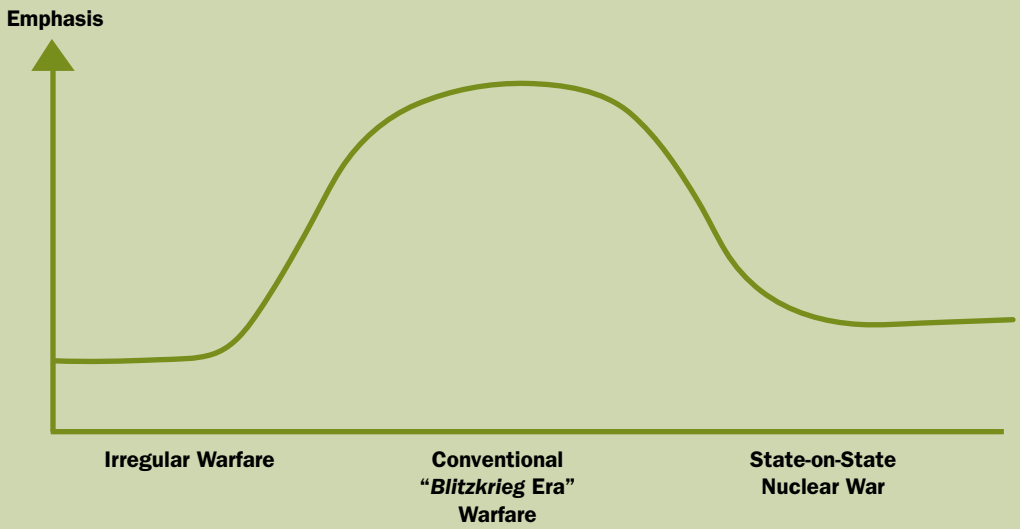
[9] Costco (formerly "Price Club") is a chain of warehouses that sell consumer products, typically in bulk, at prices that are substantially lower than those found in retail outlets. For example, you can get catsup at a very good price, if you are willing to buy a package of eight bottles, or a gallon-size bottle. Assuming you need catsup and lots of it, this investment makes sense. If, however, you find at your barbeque that your guests enjoy mustard and relish on their hot dogs, and not catsup, as you anticipated, your purchase may prove a poor one.

challenges to US security. Prior to 9/11, it was difficult to state with conviction *what* the next major threat to US security might be, *when* it would manifest itself, and *how* it would be advanced. Recent events have done much to reduce this uncertainty. What have emerged are three new and very different military challenges that are likely to prove enduring, occupying US defense planners for the next decade or two, and perhaps longer. What is less certain is how exactly these competitors will leverage their resources in attempting to shift the military balance in their favor.

RISE OF NON-STATE, TRANSNATIONAL STRATEGIC COMPETITORS: MILITANT ISLAM

The first and most obvious long-term challenge is that posed by radical Islamists and other militant nonstate entities. The so-called Long War with these groups may have begun as long ago as 1979, when Iranian radicals seized the US embassy in Teheran and held its American staff hostage for over a year. Over the last decade, however, these groups, which have elements from both the Sunni and Shia Muslim sects, have begun waging a form of modern insurgency warfare that exploits a range of technologies and capabilities that were unavailable to insurgent movements a generation ago. Today's insurgents make use of the internet, cellular communications, laptop computers and other media storage devices, the global media, long-range rockets,

FIGURE 1. **THE COLD WAR ERA INVESTMENT PROFILE**



Source: CSBA

armor-piercing weaponry and guided weapons to great effect.[10] Some groups are also seeking to acquire and exploit other technologies, to include nuclear weapons. In the case of radical Islamists, their immediate objective is to overthrow regimes in the Islamic world that are friendly toward the United States, and to evict the US from parts of the world viewed as vital to America's interests.

In particular, the radical Islamists' lack of respect for the laws of war and the lives of innocents, combined with their apparent willingness to employ weapons of mass destruction and mass disruption should they acquire them, makes this insurgency especially threatening to developed, democratic nations and the growing economic globalism that began in the late 20th century. Moreover, insurgencies and wars of religion tend to be protracted affairs and, particularly in the case of religious wars, rather bloody as well. No one should be under the illusion that this war will be won quickly, or that the price of victory will be cheap. As with most insurgencies, the remedy rests less in military action than in the successful treatment of political, economic and social ills. In this case, the problem is exacerbated by the difficulties some Islamic states have had in coming to terms with Western economic and military superiority in recent centuries. But success in dealing with them will take years, and more likely decades. In the interim, it will be the military's job to develop the doctrine and capabilities needed to defend vital US security interests against this threat, while seeking opportunities, where possible, to assist friendly governments and indigenous forces to defeat radical Islamist elements that threaten their security.

SPECTER OF A PROLIFERATED WORLD: NUCLEAR-ARMED ROGUES

The second major and enduring challenge to US security that has crystallized in recent years is the spread of nuclear weapons to unstable and/or hostile states. Since 1998, India and Pakistan have tested nuclear weapons and created nuclear arsenals. North Korea tested a nuclear device in 2006, apparently has several nuclear weapons, and may be producing the fissile material necessary to fabricate more of these devices.[11] Today Iran, no doubt aware of the very different treatment accorded North Korea by the United States relative to a non-nuclear Iraq, is likely pressing forward vigorously with its nuclear weapons program. The Iranian leadership has observed US guided-weapon/battle-network capabilities, and since Iran has little prospect of being able to compete head-to-head with the American military in this area, nuclear

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[10] To be sure, the Mujahideen employed US Stinger guided antiaircraft missiles against Soviet forces during their insurrection in Afghanistan during the 1980s. However, guided weapons were not used by irregular forces in significant numbers against US and other Western militaries until recently.

[11] "North Korea Claims Nuclear Test," *BBC News*, October 9, 2006, available at http://news.bbc.co.uk/2/hi/asia-pacific/6032525.stm, on July 16, 2008; "North Korea's Nuclear Weapons: How Soon an Arsenal?" *CRS Report for Congress,* RS21391, February 2, 2004, p. 1; and David E. Sanger, "North Korea Says it Now Possesses Nuclear Arsenal," *New York Times,* April 24, 2003.

weapons are a logical alternative. It is conceivable, therefore, that before the decade is out, a solid front of nuclear armed states will stretch from the Persian Gulf to the Sea of Japan, running through Iran, Pakistan, India, China and North Korea—a five-thousand mile atomic "Arc of Instability" in a part of the world which has become increasingly important to US security and economic well-being. Moreover, should Iran become a nuclear-armed state, it is likely that several Arab states, and perhaps Turkey as well, will seek to become nuclear powers.[12]

The nuclearization of Asia poses major and enduring challenges for the United States and its military. For example, it is not clear that these states will view nuclear weapons in the same way that the US political leadership has come to view them over the years; i.e., as weapons of last resort, to be used only under the most extreme circumstances.[13] The acquisition of nuclear weapons by hostile Third World regimes clearly creates a discontinuity in the military competition and disrupts the military balance between these countries and the United States. As a consequence, the United States may be compelled to accord sanctuary status to nuclear-armed states. Indeed, that seems to be a principal motive for North Korea and Iran to acquire nuclear weapons. If this occurs, as seems likely, it will reduce substantially, and perhaps precipitously, US freedom of action in two regions of vital interest. It may also make it far more difficult for the US military to deal effectively with ambiguous forms of aggression, such as Iran's support for the insurgency in Iraq, or potential North Korean trafficking in fissile materials.

The United States is now in an era that might be characterized as a "Second Nuclear Regime."

The proliferation of nuclear-armed states also increases the likelihood that these weapons will be used in the future. Again, it is not clear that they will be viewed as weapons of last resort, or that the regimes possessing them will take the kinds of precautions to secure them against unauthorized use that the mature nuclear powers have put into place over the years. Moreover, owing to the relative instability of these states when compared to the mature nuclear powers, it is conceivable that these weapons could fall into the hands of nonstate entities, either as a consequence of corruption (e.g., the unauthorized sale of a nuclear weapon to a nonstate entity), or state failure (e.g., possession by a faction in a civil war; seizure by radical Islamists). Given their political and economic instability, it is also conceivable that such a state would consciously provide, for a price, nuclear weapons to other states, or even nonstate entities.

To put it bluntly, the United States is now in an era that might be characterized as a "Second Nuclear Regime," with the First Regime that began in 1945 with the attacks on Hiroshima and Nagasaki having passed into history. That earlier regime was characterized by a small number of "mature" great powers possessing nuclear

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[12] Richard Beeston, "Six Arab States Join Rush to Go Nuclear," *The Times,* November 4, 2006; and William J. Broad and David E. Sanger, "With Eye on Iran, Rivals Also Want Nuclear Power," *New York Times,* April 15, 2007.

[13] In retrospect, it is not clear that the Soviet leadership seamlessly shared these views during the Cold War.

weapons, with all but China having a European cultural orientation. During that period, which lasted until the early 1990s, there developed a strong tradition of non-use of these weapons. Now, with the growth in the number of nuclear-armed Asian states, the first principal characteristic of the old regime no longer holds. Moreover, the tradition of non-use is now open to debate, particularly for Islamic jihadists, who may see themselves as having little to lose and much to gain by violating the post-Nagasaki taboo against nuclear use.

If we expand the definition of this regime to one encompassing *all* weapons of mass destruction—to include chemical and especially biological weapons—then it could turn out that the number of second- and third-tier powers experiencing a discontinuous leap in their military potential might be expanded to include nonstate actors. By all accounts, biological weapons are becoming progressively easier to fabricate—certainly far easier than nuclear weapons—and, under the right conditions, can produce the mass casualties, economic disruption and terror associated with a nuclear strike. Yet little has been done to restrict the knowledge associated with developing biological weapons, and the infrastructure costs for producing them are quite modest when compared to those associated with nuclear weapons.[14] For nonstate entities, this combination of comparatively low cost and high destructive potential may make the pursuit of biological weapons irresistible.

RISE OF AUTHORITARIAN CAPITALIST POWERS: THE CASE OF CHINA

The third and most traditional major enduring challenge the United States confronts is the rise of authoritarian capitalist states, of which China is by far the most noteworthy. China's ascent to great regional power status and, perhaps over time, to global power status has been both swift and, from a security standpoint, increasingly worrisome. To date, discussions about the future course of China often describe it as either a threat that must be contained, along the lines of the Soviet Union, or as a state that simply needs to be engaged and brought more fully into the global economy to ensure it will remain a member in good standing of the international community.[15]

The truth probably lies somewhere in between these rosy and gloomy poles. China does not represent the type of threat posed by the Soviet Union. For example, unlike Soviet Russia, China is not wedded to an aggressive, expansionist ideology. Furthermore, whereas the United States had no significant commercial relationship

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[14] Steven M. Kosiak, *Homeland Security, Terrorism and Weapons of Mass Destruction: A Diagnostic Assessment* (Washington, DC: Center for Strategic and Budgetary Assessments, 2003), pp. 47–56.

[15] See, for example, Aaron L. Friedberg, "Ripe for Rivalry: Prospects for Peace in a Multipolar Asia," *International Security,* Winter 1993/1994, pp. 5–33; David C. Kang, "Getting Asia Wrong: The Need for New Analytical Frameworks," *International Security,* Spring 2003, pp. 57–85; and Amitav Acharya, "Will Asia's Past be its Future?" *International Security,* Winter 2004, pp. 149–164.

with the Soviet Union, it has an enormous economic relationship (and trade deficit) with China. Moreover, both the United States and China may have important common security interests in the area of limiting WMD proliferation and combating radical Islamists. Thus a more appropriate analogy, if there is one, may be to view the relationship as similar to that which existed between Great Britain and France around the turn of the 20th century. At the time, France, like China with the United States, had a long and often contentious relationship with Britain. Yet the next hundred years found Britain and France acting and fighting as allies against threats that transcended their old antagonisms.

On the other hand, China could emerge as a major threat to US security, in the manner of Germany vis-à-vis Britain a century ago. China is beset by questions of political legitimacy; growing ecological problems; an economy that has enjoyed remarkable growth, but which may be entering a more mature period characterized by slower growth rates; a demographic imbalance favoring males that could induce societal instabilities; a growing need for foreign energy supplies; and outstanding security issues in the form of Taiwan, the Spratley Islands, Tibet, and perhaps portions of the Russian Far East. This could lead to friction between Washington and Beijing, especially if the other two major threats to international peace and order are considered by either to be subordinate to the Sino-American rivalry.

The Chinese military is vigorously pursuing capabilities designed to deny access to the global commons.

There is also some evidence that China seeks to displace the United States as the principal military power in East Asia, and to establish itself as the region's hegemonic power.[16] If this were to occur naturally, as a matter of the evolution of Chinese economic power and corresponding increase in influence, the United States would probably accept such an outcome. However, if Chinese preeminence were achieved through coercion or aggression, this would serve neither US interests in the region, nor the stability of the international system.

Unfortunately, recent Chinese military activity is raising concerns regarding its willingness to engage in the "peaceful rise" or "peaceful development" its leadership has proclaimed. Instead, the Chinese military is vigorously pursuing capabilities designed to deny the United States, and other nations, access to the global commons — space, cyberspace, the seas and the undersea — while also creating capabilities that could enable Beijing to engage in coercion of China's East Asian neighbors, especially Taiwan, South Korea and Japan.

The challenge for the United States, then, is to encourage China to cooperate in areas where the two countries have common security interests, and to convince Beijing

[16] See Aaron L. Friedberg, "The Struggle for Mastery in Asia," *Commentary,* November 2000, pp. 17–26; Office of the Secretary of Defense, Annual Report to Congress: The Military Power of the People's Republic of China 2007, at http://www.defenselink.mil/pubs/pdfs/070523-China-Military-Power-final.pdf; accessed on August 26, 2007; and Jason E. Bruzdzinski, "Demystifying *Shashoujian:* China's 'Assassin's Mace' Concept," in *Civil–Military Change in China: Elites, Institutes, and Ideas After the 16th Party Congress,* Larry Wortzel and Andrew Scobell, eds. (Carlisle, PA: U.S. Army War College, 2004), pp. 309–364.

that its resolution of outstanding geopolitical issues should be accomplished within accepted international legal norms. This means creating and maintaining a military balance in East Asia that is favorable to the United States and its allies against those kinds of contingencies that might tempt Chinese efforts at coercion or aggression.

A NEW COMPETITIVE ENVIRONMENT

These challenges for US defense planners are not only different from that posed by the Soviet Union during the Cold War, they also vary widely in two important ways from the major security threats confronted by the United States during the 20th century. First, the last century was characterized by rivals that challenged the United States directly, or symmetrically. The organization and equipment of the US military was generally similar to the militaries of its principal adversaries. The Kaiser's army, the *Wehrmacht,* and the Red Army looked more like their American counterpart than, say, the radical Shiite cleric Muqtada al-Sadr's Mahdi Army, the Iranian Revolutionary Guard Corps or even China's People's Liberation Army (PLA). The same can be said regarding the US Navy and Air Force and their principal 20th century competitors. Put another way, if the 20th century produced an age of symmetrical competitions for the US military, the 21st century promises, at least over the foreseeable future, to be an Age of Asymmetric Warfare.

Second, the geographic focus of the major challenges to US security has shifted from Europe in the 20th century to Asia in the 21st. World War I had an overwhelming European focus. Although World War II was truly global in its character, the US strategy focused on "Germany first." During the Cold War ("World War III"), the main US focus remained in Europe, in terms of forces, resources, and planning effort. Now, however, we find that in the 21st century Europe is displaced by Asia, host to all three major enduring challenges to US security. In summary, not only have the main challenges to US security changed dramatically in *form,* but their *location* has changed as well. Together, these two changes represent a strong argument for a significant shift in the Defense Department's investment strategy.

CHAPTER 2 > **NEW PLANNING ISSUES**

As noted in the previous chapter, the three enduring challenges to US security are likely to manifest themselves in quite different forms from those that dominated the Cold War American military's attention. The old, familiar threats posed by the Soviet military have, in many instances, dissipated under the weight of the US military's primacy in key traditional warfare areas. There is no blue-water navy to challenge the US fleet's maritime dominance. Indeed, the US Navy seems to have entered a period of prolonged dominance, such as has not been seen since the Royal Navy enforced the Pax Britannica two centuries ago. As for capabilities to strike through the air, would-be adversaries seem more intent on acquiring missile forces rather than manned aircraft. One also searches in vain to identify the country that seeks to field large, mechanized ground forces as the means by which to challenge the US Army's legions.

It is clear, but perhaps not surprising, that defense planners are struggling to keep up with the rapid pace of events. Yet as much as the world has changed in the last six years, more change is almost certainly on the way. Concerns regarding a fundamental change, or discontinuity, in the character of key military competitions remain valid. The attacks of 9/11 and the subsequent conflicts in Afghanistan and Iraq are only "Exhibit A" in a much broader transformation of the character and location of conflict. The three enduring challenges mentioned above, while providing some clarity for those crafting investment strategies, also induce considerable uncertainty into the planning process, as it is far from clear how these challengers will apply existing and emerging means of warfare to achieve their goals in what is very likely to be a protracted competition. Thus the Department's investment profile, relative to the Cold War era, must cover a wider range of contingencies, while also accounting for the prospect of additional discontinuities (see Figure 2).

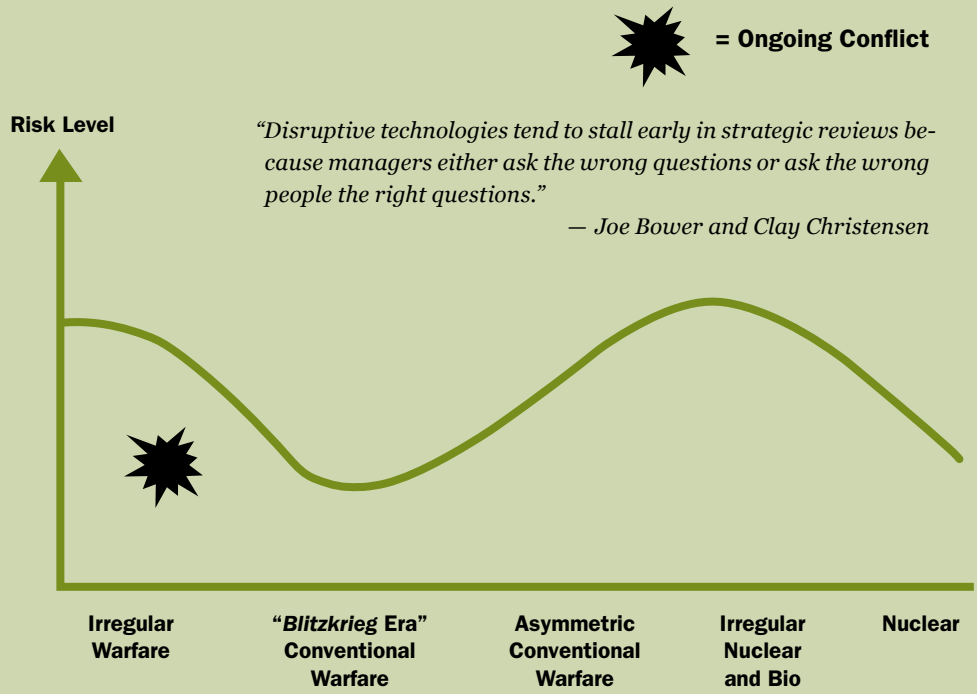
Again, if the diagnosis set forth above is correct, it should have a profound effect on Defense Department investment strategies. Addressing the challenge of transforming the US military in anticipation of a discontinuity in the competition proved difficult in the decade preceding 9/11; indeed, historically speaking, effective transformation

has always been a struggle for military organizations. Given the demands of an ongoing war, transformation is proving to be even more difficult now. There is also a danger the Department will default to pursuing "transformation through its rear-view mirror"—undertaking reactive transformation to address immediate challenges that were not prepared for over the preceding decade. Put another way, if transformation is now defined as taking steps to prevail in the current wars in Afghanistan and Iraq, the US military may lose sight of the need to prepare for emerging challenges that are likely to be as different from what they confront in Southwest Asia today as this conflict is from those of the Cold War era.

ALLIES

The difficulty in coming to grips with the new challenges to US security is further complicated by the increasing instability of US alliance relationships. Allies are proving to be less reliable than during the Cold War era, and it has become increasingly difficult to assume that today's principal allies will provide the same relative level of military support as they did in the past. In nearly every case over the past fifteen years ally defense investments have declined substantially relative to the US military

FIGURE 2: **NEW ERA INVESTMENT PROFILE**



Source: CSBA

effort. Furthermore, many of America's potentially most capable allies are in Europe, whereas the locus of the principal threats to US security now resides in Asia. While there has been talk of the European allies developing a significant, modern "out-of-area" military capability, to date there has been little action to match the rhetoric. European allies seem likely to lag ever further behind the US military in terms of transformation. Moreover, allied perceptions of threats may differ significantly from those of the United States, as was the case in the Second Gulf War and, to a lesser extent, in Afghanistan and with regard to Iran's drive to acquire nuclear weapons. This has produced a decline in NATO support for US positions and actions. This is quite different from the Cold War era, when there was a much stronger shared threat perception of the threat posed by the USSR. Thus not only are ally capabilities in relative decline, but their willingness to employ them may be declining as well.

European allies seem likely to lag ever further behind the US military in terms of transformation.

Finally, as a consequence of the ever-growing gap between the defense efforts of the United States and those of its European allies, our allies' ability to operate effectively with the US has been increasingly impeded. In some cases, it is difficult for the US military to operate with even its more capable NATO allies without reducing its own efficiency.

To summarize, the United States must confront the issues of whether tomorrow's key allies will be drawn from the set of "traditional" allies formed during the early days of the Cold War based on common values and threat perceptions, or whether America will return to the making or breaking of allied relationships in response to shifting circumstances, or return to an even older tradition of not having allies, and only being an "associated power" in specific contingencies. And it will not only be a matter of identifying future "coalitions of the willing," but in a world of growing divergence between the US military's capabilities and those of other states, "coalitions of the capable" as well.

To employ a business investment analogy, this combination of factors will likely make it substantially more difficult for the United States to "outsource" some of its defense requirements to allies, as it did with considerable success during the Cold War. During that conflict, for example, European NATO armies provided the bulk of the ground forces for the defense of Western Europe. The mission of countermine warfare was outsourced almost exclusively (and, in hindsight, perhaps excessively) to NATO's European navies. The decline in the United States' ability to outsource certain missions, in part or in whole, will likely exert significant pressures on US planners involved in crafting investment strategies.

Finally, there is the matter of US military operations themselves. With time, these operations have become increasingly joint in character, especially with advances in technology that allow the Services to crowd into one another's traditional areas of operation, and to communicate and coordinate their efforts. This influences thinking about defense investment strategies in several ways. First, it enables more "trade

space" between the capabilities being developed by the Services.[17] Since each of the Services can operate well into another's traditional domain, it is possible, for example, to examine tradeoffs between the different Services' aviation programs. Second, it places a premium on ensuring that if the benefits of such trades are to be realized, the Services must be able to communicate and coordinate at a much more advanced level than has previously been the norm. In fact, this is one key element behind the concept of network centric warfare.[18] *However, the Department has yet to develop a way to encourage, let alone compel, tradeoffs across Service boundaries. Meeting this challenge will be critical to any successful investment strategy.* This can be seen in the Department's actions in canceling two major weapon systems during this decade: the Army's Crusader artillery system and its Comanche helicopter. In both cases the funds saved through cancellation remained almost entirely devoted toward the capability that had been terminated; i.e., Army artillery and Army aviation, respectively.

In summary, as the United States moves from an era of relative geopolitical and military-technical stability to one characterized by discontinuities, it will likely need to develop a different "portfolio" of allies and invest differently, relying less on long-term "outsourcing" and more on "building partner capacity" for the short term. Moreover, the flexibility to allocate investments across warfare areas will almost certainly be a key element of a well-crafted investment strategy. At the same time, traditional investment strategy techniques will likely be less relevant.

DISCONTINUITIES: THE CHALLENGE

The problem of addressing disruptive change is made more acute by the pressures to sacrifice future needs for current military consumption and in-kind modernization. These pressures are probably greater than they were during the latter stages of the Cold War. Consider that the United States military has been conducting major campaigns more often in recent years than it did between the end of the Vietnam War and the collapse of the USSR, leading to increased equipment consumption rates and an increased demand for "in-kind" replacement.[19] This problem shows no signs of abating, as the United States may have a large part of its ground forces tied down in

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[17] "Trade Space" is a Defense Department term that refers to the investment strategists' flexibility in reallocating funds. The greater the trade space, the greater is the investment strategists' freedom to shift funds among programs.

[18] The term network centric warfare is most closely associated with the late VADM (Ret.) Arthur Cebrowski, former head of the defense secretary's Office of Force Transformation. For a discussion of this concept, see David S. Alberts, John J. Garstka and Frederick P. Stein, *Network Centric Warfare* (N.L.: CCRP Publications, 1999).

[19] An example of this is the Army's cancellation of the Comanche helicopter, which was sacrificed in large measure to enable that Service to recapitalize its helicopter fleet, which is being subjected to far higher use rates than originally projected. This problem is similar to the person who purchases an automobile with plans to drive it 1,000 miles a month, but finds that he actually must drive 5,000 miles a month. The automobile's useful life span will decline at a much more rapid rate as a consequence.

counterinsurgency operations, particularly in Afghanistan and Iraq, for a long time to come.

It is likely that the war, and more particularly the Congressional supplemental appropriations funding, is enabling the Defense Department to modernize substantially faster and more broadly than it would otherwise be able to do. This has produced a surge in procurement funding. Yet, as will be discussed presently, increased levels of procurement funding do not necessarily yield a corresponding boost in military effectiveness. Major military capital stock items (e.g., tanks, planes, ships) typically have life spans that run for several decades. An accelerated modernization of the force that emphasizes the ongoing conflict, while understandable, may also find the US military ten years' hence with equipment that is ill-suited for some very different challenges looming on the horizon.

To this must be added the Defense Department's general inability to control its R&D costs, and to hold down unit procurement costs for new systems. Research and development funding has been relatively well-protected within the defense budget since the Cold War's end.[20] Yet the principal focus of these investments is on major platforms, while arguably the greatest advances in capabilities have been in the area of creating battle networks and guided weapons.

Increased levels of procurement funding do not necessarily yield a corresponding boost in military effectiveness.

If this were not problem enough, the Department confronts the prospect of preparing for some very difficult near-term military challenges (e.g., employing conventional forces against a nuclear-armed opponent, such as North Korea, or preventing "loose nukes" from getting into the hands of enemies should an unstable nuclear power, such as Pakistan, collapse). If the Department generally failed to shift its investment strategy to anticipate changes in the military competition during the "threat trough" of the 1990s, how can it be expected to do so when confronted by these formidable immediate challenges (some of which, it is important to note, represent major shifts from the late-Cold War/immediate post-Cold War era conflict environment)? Simply stated, while investment strategies that address prospective discontinuities should be a key part of the Department's overall investment portfolio, they risk being marginalized, especially given current circumstances, unless strong leadership is exerted by senior Department officials.

Continuing the "Costco" approach to defense investments, even given the ongoing war, would almost certainly be a mistake. In an era of existing and prospective discontinuous change, the US military's ability to adapt to, or better still, *anticipate* such changes will exert considerable influence on its competitive position. As shown in Figure 3, discontinuities can be viewed as inflection points, or major shifts in the military competition. Discontinuities can be stimulated by several factors, principal among them a combination of new military capabilities, warfighting concepts and

[20] For example, the Defense Advanced Projects Agenda (DARPA) has a current budget of $3.3 billion, the largest in its history.

organizational structures that together bring about a military revolution.[21] One example of a military discontinuity is the revolution in naval warfare during the 1920s and 1930s, stimulated principally by rapid advances in aviation technology that enabled aircraft carriers to supplant battleships as the preeminent form of military power at sea.[22]

Discontinuities are often difficult to predict, both in terms of when they will occur and how they will influence the character of warfare. Consequently, during periods of great military discontinuity, or military revolution, the level of risk and uncertainty is considerably higher than during periods of evolutionary change. Thus militaries can incur severe penalties if they fail to transform, or if they pursue the wrong transformation path.[23]

Another barrier to anticipating discontinuities is that, as in the commercial sector, the newly dominant force characteristics tend to under-perform legacy force characteristics in at least one key area of the passing military regime. As Clayton Christensen has observed:

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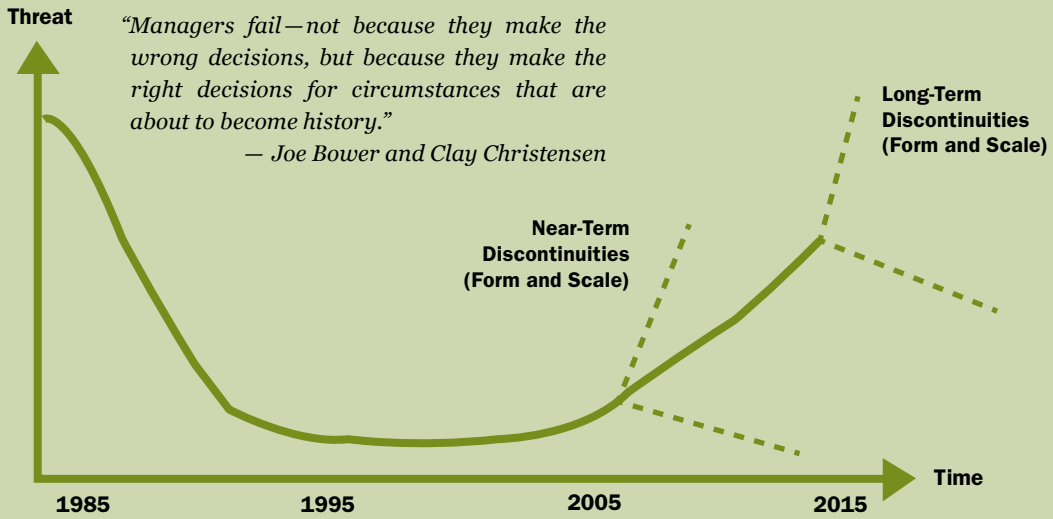
[21] Andrew F. Krepinevich, *The Military-Technical Revolution: A Preliminary Assessment* (Washington, DC: Center for Strategic and Budgetary Assessments, 2002). This is a reprint of an internal Defense Department document initially published in 1992.

[22] For a discussion of this revolution, see Andrew F. Krepinevich, "Revolution at Sea: The US Navy and Carrier Aviation," unpublished paper, n.d.

[23] Arguably, the latter condition is the more serious. Pursuing the wrong transformation path presents the illusion that the military is adapting to different circumstances when in fact it is not. Moreover, it may prove very difficult to deviate off the chosen path as new force elements, doctrine and capabilities are developed and take root.

FIGURE 3. **INVESTING UNDER DISCONTINUOUS CHANGE**



Source: CSBA

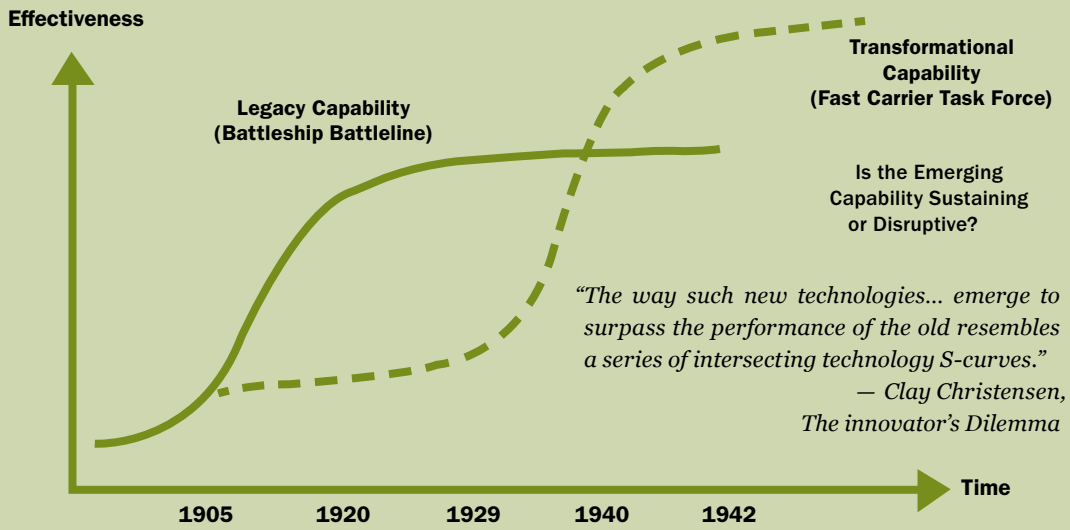
> Disruptive technologies, though they initially can only be used in small markets remote from the mainstream, are disruptive because they subsequently can become fully performance-competitive within the mainstream market against established products.[24]

This makes it difficult for advocates to win over more traditionally minded individuals to the merits of the new capability. For example, the carrier air wing that came to dominate warfare in the Pacific during World War II possessed only a small fraction of a battleship's firepower. What proved crucial, of course, was the carrier air wing's ability to apply that firepower over far greater distances than could battleships. In reviewing the history of this discontinuity, we find that the carrier initially could not compete with the battleship for primacy within the fleet. Carrier aircraft lacked the range and payload capacity to do much more than serve as scouts for the fleet and spotters to enhance the accuracy of the battle line's guns. Over time, however, as more powerful aircraft engines enabled carrier-based planes to fly distances measured in the hundreds of miles and to carry thousand-pound bombs, and as dive-bombing techniques were discovered and perfected, carrier aircraft became ship-killers, and the carrier's value increased immensely—with a corresponding relative decline in the value of the battleship. The phenomenon can be depicted as a series of overlapping S-curves, similar to those described by Christensen (see Figure 4).[25] One wonders if unmanned combat air systems (UCASs) might represent the same kind of capability

[24] Clayton M. Christensen, *The Innovator's Dilemma* (New York: HarperBusiness, 2000), p. xxvii.

[25] Christensen states that "The way such new technologies . . . emerge to surpass the performance of the old resembles a series of intersecting technology S-curves." Christensen, *The Innovator's Dilemma,* pp. 44–47.

FIGURE 4. **MILITARY DISCONTINUITIES: NAVAL AVIATION**



Source: CSBA

relative to manned systems or, more generally, whether robotic systems that generally underperform manned systems will, over time, prove more effective for conducting a significant number of missions. Consider that, to date, unmanned systems have generally been used to support the current air operations regime that is dominated by manned systems. Over time, however, it may be possible to operate large numbers of unmanned systems simultaneously in a wide range of missions, rendering much of manned aviation subordinate to the new regime, just as the battleships were reduced to subordinate status with the rise of carrier aviation in World War II.[26]

Discontinuities typically result in a precipitous decline in the effectiveness of certain military forces/capabilities, and in the capital stock assets associated with them.

Discontinuities typically result in a precipitous decline in the effectiveness of certain military forces/capabilities, and in the capital stock assets associated with them. For instance, in the example given above, as carriers came to dominate operations at sea, battleships saw their role diminish. Initially, they were reconfigured as anti-aircraft platforms for protecting the carriers, and used their big guns to provide fire support for amphibious assault operations.[27] But, like old soldiers, the battleship gradually faded away. The Montana-class battleships were cancelled shortly after the battle of the Coral Sea in 1942. Thereafter battleships, which only a few years before were viewed as the arbiters of maritime dominance, vanished entirely from the Navy's shipbuilding program.

Discontinuities also find some emerging military capabilities ascending rapidly to positions of prominence. In this case, of course, prominence was now accorded to the aircraft carrier. Thus for those militaries that pursue anticipatory transformation, discontinuities can be sources of great opportunity. For example, the German Navy's ability to exploit the rapidly advancing technologies enabling submarines to impose a new kind of strategic blockade nearly brought Great Britain to its knees in World War I. The US Navy's rapid shift to "carrier-centric" operations, and its ability to do so on a large scale, against Japan's carrier forces during World War II enabled it to defeat, within a remarkably short period of time, one of the world's most powerful and innovative navies, even after the losses suffered at Pearl Harbor.[28]

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[26] Moreover, should directed energy systems mature around the same time as unmanned systems, this could further compromise the dominance of manned systems by making the air/air defense competition more favorable to the defense.

[27] In light of the success of the Japanese *Kamikazes* off Okinawa, after World War II the Navy began investing heavily in surface-to-air missiles for fleet defense against air attack, in addition to continuing to rely upon aircraft to intercept attacks. Eventually guided-missile cruisers and destroyers replaced the battleship in this role as well. Later still, when these combatants gained a land-attack capability with cruise missiles, they supplanted the few Iowa-class battleships providing this capability.

[28] Lest too much credit be given to the United States' preparedness to conduct fast carrier task force operations after Pearl Harbor, the reader should note that had the American battleships survived the attack, rather than the carriers, it is not clear that the carriers would have been used as they were. To some extent the carriers were employed as they were out of necessity. Even at the Battle of Santa Cruz in October 1942, the two US carriers engaged operated in different task groups, not in the concentrated fast carrier task forces that became legendary after the war. Partly this was due to the fact that long-range radio communications and radar had yet to be fully integrated into fleet operations. The author is indebted to Jan van Tol for this insight.

Clearly one key to successful investing in periods of discontinuity is an ability to identify those capabilities that stand to lose much of their value once the major shift occurs in the competitive environment, and those that will grow rapidly in value. This is not easy, as the exact time and form of discontinuities are difficult to predict with confidence. Nevertheless, there are ways to increase the odds of investing wisely, even in such periods of discontinuous change. They will be discussed presently.

Clearly one key to successful investing in periods of discontinuity is an ability to identify those capabilities that stand to lose much of their value once the major shift occurs in the competitive environment, and those that will grow rapidly in value.

A Matter of Time

Unfortunately, history also tells us that there may be little time to adapt for those who fail to anticipate and prepare for discontinuities. Consider the French Army, widely regarded as Europe's (and likely the world's) finest ground force between the world wars. Yet the French military leadership failed to act with sufficient speed or vigor to exploit the potential inherent in rapid advances in aviation, mechanization and wireless communications to transform warfare. Consequently, the French Army, which had fought the German Army to a standstill for four years during World War I, was defeated by the *Wehrmacht* in six weeks in 1940. This came to pass despite the fact that Germany had only begun to rearm itself in 1935, a mere five years before its striking victory.

Had the United States not been prepared to conduct fast carrier task force operations following the attack on Pearl Harbor, the Imperial Japanese Navy would have had a free hand in the Pacific.[29] This would almost certainly have made defeating Japan a far more difficult proposition than it was historically. The point here is that there is often a severe penalty in terms of risk to national security for failing to prepare properly for the dramatic changes in warfare brought about by discontinuities.

Thus, an ability to compete based on time is likely to be an important element of investment strategies during periods of discontinuous change. Rather than letting an evolving threat pace the rate of change in US military capabilities, as was the case during the Cold War, far greater weight must be given to the metric of time. Specifically, high priority must be placed on compressing the time it takes for investments to create military capability that will enable the US military to prevail

[29] The US Navy began wargaming carrier forces in the early 1920s, before it had even a single operational carrier. Between the world wars, the Navy conducted a continuous series of fleet exercises in addition to these games to refine its concepts and equipment for conducting carrier-based warfare.

in key post-discontinuity competitions. Alas, for a variety of reasons, time-based competition is not one of the US military's strong suits.[30]

DEALING WITH RISK AND UNCERTAINTY

The objective of any defense investment strategy is to minimize the overall threat to national security. The ability to do this is limited by risk and uncertainty. Risk is randomness with knowable probabilities; i.e., we have some sense of what the probabilities might be (e.g., low, medium, high). Uncertainty is randomness with unknowable probabilities.[31] These might be termed "wild card" events — events that are essentially wholly unanticipated. There is no way to put a value on "uncertainty."

Both risk and uncertainty impose costs on US defense investments. Costs are incurred because an investment strategy simply cannot take into account all the myriad factors that will shape the future competitive environment. Some adjustments to the defense program will inevitably be needed to correct mistaken assumptions concerning the future. Of course, a wise investor does not pursue a strategy that focuses on a specific future, particularly in periods of discontinuous change, in which surprise is endemic and risks are relatively high. As will be discussed presently, investors typically develop strategies to hedge against risk and uncertainty, to be prepared to compete at least at minimal acceptable effectiveness levels across the range of plausible futures. This implies that some resources — those whose purpose is to address a future that does not emerge — will be "wasted," or at least not employed optimally.

Sadly for defense planners, there exists no algorithm or formula that will give a precise answer to the question of what constitutes the optimum investment strategy — uncertainty is simply too great, given that military competitions are both complex and nonlinear.[32] The key issue for those crafting investment strategies, then, is whether to address risk and uncertainty head-on, or to assume it away. Arguably, this latter approach characterized Defense Department planning in the immediate post-

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[30] With the advent of the information technologies revolution and repeated discontinuities in the corporate sector, "time pacing" has become an increasingly important attribute. As Kathleen Eisenhardt and Shona Brown point out:

> For most managers, event pacing constitutes the familiar and natural order of things. Companies change in response to events such as moves by the competition, shifts in technology, poor financial performance, or new customer demands... In contrast, time pacing refers to creating new products or services, launching new businesses, or entering new markets according to the calendar.

See Kathleen Eisenhardt and Shona Brown, "Time Pacing: Competing in Markets that Won't Stand Still," *Harvard Business Review,* March–April 1998, reprinted in Harvard Business Review, *On Managing Uncertainty* (Boston, MA: Harvard Business School Press, 1999), p. 178.

[31] James D. Morrow, *Game Theory for Political Scientists* (Princeton, NJ: Princeton University Press, 1994), pp. 28–29.

[32] See Alan Beyerchen, "Clauswitz, Nonlinearity, and the Unpredictability of War," *International Security,* Winter 1992/93; and John W.R. Lepingwell, "The Laws of Combat?" *International Security,* Summer 1987.

Cold War period. Both the 1993 Bottom-Up Review (BUR) and the 1997 Quadrennial Defense Review (QDR) emphasized planning and investments based on the US military's experience in the First Gulf War. The "major regional conflicts" (MRCs) that are at the BUR's core were derived from a RAND Corporation study based on the 1991 conflict. And the "major theater war" (MTW) construct developed in the 1997 QDR is essentially a first-order derivation of the MRC. Yet, as General Colin Powell observed, "Desert Storm was the Cold War battle that didn't come…."[33] In essence, then, US defense planning in the 1990s remained rooted in Cold War era precepts. The uncertainties of a rapidly shifting geopolitical and military-technical world were, if not entirely ignored, greatly discounted.

One pitfall that investment strategists must avoid is to using uncertainty as a rationale to avoid major change. The temptation to adopt a "wait-and-see" attitude (i.e., an attitude which maintains the current trajectory of defense investments predicated on the assumption that the future competitive environment will be a linear extrapolation of recent experiences) can be great. Decision-makers can fall prey to the illusion that, by doing so, they are preserving their options. But this is a chimera. Choices *are* being made. Resources *are* being allocated. What is in fact occurring under a "wait-and-see" investment strategy is a continuing expenditure of resources—including *time*—that projects the Defense Department along the existing path into the future, driven by previous assumptions, expressed or implied, about what the future will bring. Consequently, in periods of discontinuity, the "wait-and-see" approach to investing actually *increases* risk. It does so for the simple reason that, by definition, major shifts in the competitive environment are anticipated but not accounted for in defense investments.

In periods of discontinuity, the "wait-and-see" approach to investing actually *increases* risk.

The one exception is a "wait-and-see" strategy that both *delays investments* and is capable of being executed along *highly compressed timelines* when the discontinuity is revealed. This is not a practicable strategy for the United States for two reasons. First, the Defense Department lacks the ability to compete effectively based on time. Second, in times of war, such as the United States now finds itself, there is a need for near-term military capability, and for military capabilities that are similar to those already in existence—i.e., those that are "proven" and "reliable." During periods of discontinuous change, however, this can lead to less than optimal investments. This can be particularly dangerous when the immediate threat (e.g., radical Islamist insurgents) is low relative to the threat anticipated over the longer term (e.g., a nuclear-armed Asia; an expansionist China), and where the longer-term threat presents a substantially different set of challenges than the ones confronted today.

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[33] Secretary of Defense Les Aspin and General Colin Powell, "Department of Defense Bottom-Up Review," Department of Defense News Conference, September 1, 1993, Pentagon, Washington, DC. Powell stated, "Desert Storm was the Cold War battle that didn't come, without trees and mountains. We got a nice desert, and a very, very incompetent enemy to work against."

TYPES OF RISK

What kinds of risk should those charged with developing investment strategies take into account? The following types warrant consideration:

TEMPORAL. Temporal risk pertains to a military's ability to react and adapt with sufficient speed to new challenges or discontinuities. The greater the temporal risk, the greater the need for an investment strategy to hedge against surprise. As the case of the French Army, presented earlier in this report, makes clear, during periods of anticipated or existing discontinuity in warfare, the premium paid to deal with temporal risk can be quite high. Thus, the incentive to invest in those capabilities and processes that enable the Defense Department to compete based on time should be high.

GEOPOLITICAL. Geopolitical risk concerns the prospect of significant shifts in alliance relationships, which could deprive the United States of significant military capability in the form of allied military assets, base rights, overflight rights, etc. At present, US geopolitical risk appears substantial, as some allies and friends have declined to support the United States in several recent military operations.

POLITICAL/SOCIETAL. Here the risk pertains to shifts in what the American people are willing to sanction in terms of military capabilities and operations. For example, apart from their potential military utility, there is strong opposition among some quarters of the US political elite to investing in space-based weaponry or very low-yield nuclear warheads. An investment strategy must take into account potential shifts in the political and social culture of the country, as reflected in the party which assumes control over the executive branch of government and the Congress. Moreover, discontinuities, such as the attacks of 9/11, can yield not only a major shift in the military competition, but also an increase in the military's strategic degrees of freedom.[34]

An example of this is found in US attitudes toward unrestricted submarine warfare. During World War I the United States vigorously condemned Germany's pursuit of this form of warfare. Germany's resumption of these operations in January 1917 was a proximate cause of America's entering the war on the side of the allies in April 1917. Yet less than 25 years later, in the immediate aftermath of Japan's attack on Pearl Harbor, US Navy submarine skippers were instructed to initiate unrestricted submarine warfare against all shipping bound for Japan.[35] Fortunately, the Navy had

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[34] After 9/11, for example, support for aggressive US military operations to strike at radical Islamists and regimes perceived as friendly to them increased dramatically, leading to the invasions of Afghanistan and Iraq. Similarly, following the attacks on Pearl Harbor, the American public sanctioned the bombardment of German, Italian and Japanese cities. The United States had previously condemned such operations when conducted by Germany.

[35] See Williamson Murray and Allan R. Millett, *A War to Be Won* (Cambridge, MA: Harvard University Press, 2000), pp. 223–27.

invested sufficient resources in its submarine arm to enable a relatively rapid shift in operational focus.[36] The campaign prosecuted by the US Navy's submarine forces was both more ruthless and more successful than similar campaigns waged by Germany in the two world wars.

TECHNICAL. Technical risk addresses the problem that arises if calculations regarding the enemy's access to new technologies and military capabilities prove overly optimistic or pessimistic. The same concern exists with technologies/capabilities that the Defense Department believes will be introduced into the force. If assumptions with respect to the pace of development and diffusion of key technologies prove wrong, the effects on the US defense posture could be substantial. Consider, for example, the US military's bet that highly distributed, highly networked, highly integrated joint forces can be fielded and made to operate with high effectiveness over the planning horizon, typically set in the QDR at 20 years. If this capability can be realized within that time frame, it could greatly enhance US forces' ability to operate independent of access to large, fixed forward bases. This would have profound implications on the US global basing posture, power-projection doctrine, and capability requirements. It would also do much to defeat emerging anti-access/area-denial capabilities being developed by existing (i.e., Iran) and potential (i.e., China) rivals of the United States.[37]

OPERATIONAL. The problem associated with operational risk involves assumptions regarding the effectiveness of military doctrine against existing and emerging threats. The US Army, for example, is asserting that its Future Combat Systems, whose anticipated cost exceeds $150 billion, is well-designed to conduct operations in an irregular warfare environment. But the Army has yet to demonstrate this convincingly.[38] Another example of operational risk is the French Army's post-World War I doctrine of

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[36] To be sure, the Navy's submarine arm struggled to adapt to this mission, owing principally to defects in its weapons and problems with its submarine skippers. American torpedoes suffered from several failures, among them improper depth settings, premature detonations, and duds. It took nearly two years to remedy these problems. Keith Wheeler, *War Under the Pacific* (Alexandria, VA: Time-Life Books, 1980), pp. 42–47. Most submarine commanders, trained prior to the war to scout for the enemy fleet without revealing their position, continued to exercise extreme caution in their new mission to sink enemy warships and transports. Many had to be relieved and succeeded by commanders with much more aggressive temperaments. It took nearly two years to bring about the entire change in the submarine force. Stephen Peter Rosen, *Winning the Next War* (Ithaca, NY: Cornell University Press, 1991), p. 139.

[37] Generally speaking, anti-access forces are designed to deny US forces access to forward bases. Area-denial capabilities are generally directed at denying US forces freedom of action in the littoral. In a larger sense, anti-access strategies seek to prevent US forces from entering a theater of operations, while area-denial strategies look to deny US forces freedom of action in a particular area within the theater of operations.

[38] According to the Army's Training and Doctrine Command (TRADOC), "The Objective [Future] Force must be designed for success in any type of operation while *optimized for major theater war*." [Emphasis added.] US Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525–3–90/O&O: *The United States Army Objective Force—Operational and Organizational Plan for Maneuver Unit of Action* (Fort Monroe, VA: TRADOC, July 22, 2002), p. 17.

the methodical battle, which proved wholly inadequate to deal with the discontinuity in land warfare brought about by the German Army's adoption of *blitzkrieg*.[39]

INSTITUTIONAL. The risk here is that military institutions (e.g., the US Navy) may guess incorrectly concerning the type (and number) of leaders and Service members needed to compete effectively following a discontinuity, or that they fail to develop the training infrastructure needed to support this development. For example, in World War II the US Navy had to replace many of its submarine commanders early in the war owing to a major miscalculation with respect to the submarines' dominant mission. The newly dominant mission (independent commerce raiding) was so different from the pre-December 7th mission (participating in battle fleet operations) that it required skippers with significantly different personality types to execute effectively.[40] The new mission favored submarine commanders who were highly "risk tolerant" in that they had to be willing to take the risks associated with sinking enemy ships, which forfeited their submarines' principal protection—its stealth—and announced their presence to all enemy warships in the area. This contrasted with the personality profile of submarine commanders functioning as scouts for the battle fleet. Their mission emphasized avoiding detection by the enemy fleet, and hence favored captains who were generally "risk averse."[41]

Take a contemporary example. Today, the US Army is dominated by officers—especially *senior* officers—with a strong orientation on conventional operations involving "kinetic" engagements. They are a product of the Army's overwhelming focus on conventional warfare during the 20th century; the "Desert Storm" (i.e., MRC and MTW) planning environment of the 1990s; and their training at the Army's National Training Center (NTC), which until just recently emphasized conventional operations. Yet now the Army finds itself in an era of unconventional, "non-kinetic" warfare, as exemplified in its combat operations in Afghanistan and Iraq, and its part of the

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[39] The methodical battle doctrine essentially assumed that warfare after World War I reflected a linear progression in terms of the character of land combat and the capabilities employed, rather then the discontinuity that actually occurred in the late 1930s. Williamson Murray, "Armored Warfare: The British, French and German Experiences," in Williamson Murray and Allan R. Millett, eds., *Military Innovation in the Interwar Period* (Cambridge, UK: Cambridge University Press, 1996), pp. 31–32.

[40] Rosen, *Winning the Next War*, pp. 141–143.

[41] Furthermore, according to Clay Blair's *Silent Victory,* the majority of the submarine captains prior to Pearl Harbor were Annapolis graduates who had been given commands because they were reliable members of the naval establishment, did what they were told, knew how to "cooperate and graduate," etc. However, the skippers who were successful in combat generally had very different (more fighter-pilot-like) personalities. They tended to be loners who made their own decisions and resisted higher authority. In that war, the Japanese incurred institutional risk of a different type when they failed to create a large enough cadre of carrier pilots to sustain the losses they incurred in their early fleet engagements with the US Navy. Similarly, today the US military is suffering the consequences of a training infrastructure that was not designed with counterinsurgency operations in mind, even though these operations have dominated since the attacks of September 2001. Clay Blair, *Silent Victory: The U.S. Submarine War against Japan* (Annapolis, MD: US Naval Institute Press, 2001).

global campaign against radical Islamist elements. This requires major shifts in Army doctrine and training—and in both soldier skill sets and personality types.

INTELLIGENCE RISK. There is risk associated with the ability to understand the competition. Errors here can lead to major miscalculations with respect to the allocation of resources. Indeed, the better one understands one's rivals, the less likely one is to be surprised by a discontinuity in the character of warfare. There are those who argue that the United States military (indeed, the United States Government) did not understand the true magnitude or nature of the threat posed by radical Islam until after 9/11. The corporate world also offers interesting examples of firms that fundamentally misunderstood the character of the challenge being posed to them by rivals during a period of discontinuous change in their business.[42]

Conducting military operations is only one (albeit the most important) purpose of investing in military capability. Military capability can also be employed to deter and dissuade enemies and potential rivals. Capabilities are also used to reassure allies and partners. Investing wisely to achieve the objectives of deterring, dissuading and reassuring necessarily requires as thorough an understanding as possible of key rivals and close allies—both existing and potential. This understanding is derived from good intelligence regarding existing or prospective rivals, to include how they calculate costs, risks and benefits, and how they make decisions about key aspects of the military competition between themselves and the United States, its allies and partners.

FISCAL. Fiscal risk is simply the risk that the estimates made concerning the material resources necessary to execute an investment strategy prove to be substantially off the mark. A strategy works only if the means it requires are available to achieve the ends it seeks. For example, Paul Kennedy uses the term "overstretch" to describe the decline of great powers whose reach exceeded their grasp.[43] Closer to home, we find that Defense Department estimates of future procurement funding levels are often overly optimistic. Terms such as "procurement bow wave" and "O&S [Operations and

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[42] Take the case of Sears and its response to Wal-Mart's penetration of the rural consumer market, which Sears had dominated with its catalog business. Wal-Mart engineered a discontinuity in the competitive environment through its use of information technologies to revolutionize logistics. This enabled Wal-Mart to build stores in rural areas where they had previously been unprofitable. Sears proved slow to understand the character of the challenge being posed by Wal-Mart. This resulted in Sears attempting to improve its performance within the old competitive paradigm, as opposed to adapting to meet the fundamentally new challenge it now confronted. See Gary Hamel and C. K. Prahalad, *Competing for the Future* (Cambridge, MA: Harvard Business School Press, 1994), pp. 5, 14, 20, 35, 62, 65, 77, 118, 127, 178, 199, 201; and Joseph L. Bower and Clayton M. Christensen, "Disruptive Technologies: Capturing the Wave," *Harvard Business Review,* January–February 1995, reprinted in *Harvard Business Review on Managing Uncertainty* (Cambridge, MA: Harvard Business School Press, 1999), p. 148.

[43] Paul Kennedy, *The Rise and Fall of the Great Powers* (New York: Random House, 1987).

Support] migration" have long been staples of the Defense Department's lexicon.[44] Simply stated, if the resources projected to be available turn out to be greatly overestimated, the investment strategy cannot be executed.

After assessing all of these risks, a judgment call must be made by senior Defense officials as to what investment strategy minimizes the overall risk to national security — and over what time frame.[45] In seeking economies, they must also judge how much risk can be accepted without allowing the defense posture to slip below the minimum acceptable level. Where uncertainty and risk are relatively high, there is a greater need to invest in hedging positions that create capability options for a wide range of contingencies. Again, the goal is to avoid a situation where the security risk in a projected contingency is unacceptably high. Of course, hedges, which inevitably "waste"[46] some resources, are especially difficult to defend or sustain during time of war.

NEEDED: CLEAR OBJECTIVES AND CONCEPTS OF OPERATION

As John Kotter observed, "In every successful transformation . . . the guiding coalition develops a picture of the future that is relatively easy to communicate and appeals to customers, stockholders, and employees."[47] This holds true for the Defense Department as well as the private sector. Another, more familiar, saying has it that "If you don't know where you want to go, any road will take you there."

For example, in their analysis of corporate transformation in the age of rapidly advancing information technology (IT), McKenney, Copeland and Mason found that among the successful firms they examined, each had identified "a particular crisis" that needed to be resolved and "created a vision of its outcome" in a way favorable

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44 The term "bow wave" refers to a growing requirement for procurement funding in the defense program that is not being matched by the funding projected to be available. On briefing charts, this presentation can appear similar to the form of a ship's bow wave. The term "O&S migration" refers to the practice of shifting funds from research and development (R&D) and procurement accounts to cover shortfalls in the Defense Department's operations, maintenance (O&M) and personnel accounts, an action that has occurred on a regular basis for decades. Together, the O&M and personnel accounts are called "operations and support;" hence the term "O&S migration."

45 As noted above, there is a strong tendency, especially in times of war, to emphasize risk reduction in the near-term. During war, it takes considerable foresight, self-discipline and courage to accept greater risk in the near-term to invest to improve one's competitive position over the longer term. In can, however, be done. For instance, the US Navy withheld some of its best pilots in the early days of World War II to insure that its pilot training program would yield highly proficient new pilots. As Ronald Spector noted, "American flyers were less experienced than their Japanese opponents, but the U.S. Navy rotated experienced pilots between combat and training duties, thus providing a permanent nucleus of veteran instructors." Ronald Spector, *Eagle Against the Sun* (New York: Free Press, 1985), pp. 148–49.

46 Again, well-crafted hedging strategies "waste" resources in the same way that a flood insurance policy that never has a claim posted against it is "wasted."

47 John P. Kotter, "Leading Change: Why Transformation Efforts Fail," *Harvard Business Review,* March–April 1995.

to the firm.[48] This corresponds in military terms to identifying key challenges at the operational level of war and indentifying concepts of operation (complete with the required capabilities and forces) that will enable a favorable outcome.

A critical component to any investment strategy is a clear statement by the DoD leadership describing its vision of the future competitive environment, the objectives to be achieved, and how the Department's investment strategy will enable those objectives to be met. In military terms, this means investment planners must have some understanding of both the key strategic and operational challenges confronted by the armed forces, as well as the point-of-departure operational concepts for dealing with these challenges. Given this information, investment strategies can assess both existing and prospective defense human and material resources, and establish investment priorities.

When the likelihood of change is at its highest, organizations require the most input from the leadership as to what new course must be set.

The importance of sound strategic guidance during a period of discontinuous change in the military competition cannot be understated. When the likelihood of change is at its highest, organizations require the most input from the leadership as to what new course must be set. Conversely, strategic guidance on investment priorities is far less critical (although hardly irrelevant) in periods of comparative evolutionary change, for example the late Cold War era. Since the Cold War's end the Defense Department leadership has struggled to provide this kind of guidance.[49] Although the risks associated with this lapse were concealed during the 1990s, as the US confronted few challenges to its security, the attacks of 9/11 dramatically highlighted dangers of insufficient or inaccurate strategic guidance. Since then, the prospect of additional discontinuities—reflected, for example, in the challenges posed by modern insurgency warfare and China's attempt to develop novel military doctrine and capabilities—only reinforces the need to provide well-crafted strategic guidance.

The lack of a fairly detailed sense of what new challenges must be accorded priority, and how they might be successfully dealt with, can be a critical—*and potentially fatal*—shortcoming of the US defense posture. It represents an unnecessary, self-induced risk for those engaged in developing investment strategies. Fortunately, the Office of the Secretary of Defense (OSD) is working to remedy this shortcoming by developing a set of forward-looking planning scenarios. Assuming this effort is successful, the military must also create a set of operational concepts that can successfully meet the problems posed in the planning scenarios. Finally, and perhaps most importantly, these efforts must inform the creation and execution of the Department's investment strategy.

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[48] James L. McKenney, Duncan C. Copeland and Richard O. Mason, *Waves of Change* (Boston, MA: Harvard Business School Press, 1995), pp. 143, 210.

[49] For a discussion of this problem, see Andrew F. Krepinevich, *The Bottom-Up Review: A Preliminary Assessment* (Washington, DC: Defense Budget Project, 1994); Andrew F. Krepinevich, "Why No Transformation?" *Joint Forces Quarterly,* No. 23, Autumn/Winter 1999–2000, pp. 97–101; and Andrew F. Krepinevich, *Framing the Roles and Missions Debate* (Washington, DC: Defense Budget Project, 1994).

Absent a compelling vision of what discontinuities might emerge and at least some first-order assessment of how they might be addressed, there is a strong bias toward continuing down the current investment path. If leaders trumpet the need for "transformation" but fail to provide a clear sense of the new military challenges and opportunities that will define the future competitive environment, the result may find planners adopting the "wait-and-see" approach described earlier in this report. Some effort may be accorded to hedging investments (see below), but they run the risk of being ill-informed. The question, "Hedge against what?" is bound to be raised. There is no better reflection of the leadership's inability to clearly define how investments should be shaped by the desire for "transformation" than the fact that the defense investment strategy and portfolio have changed comparatively little over the past decade, despite the sense by many experts that the conflict environment is changing in fundamental ways.[50]

In cases of both military and corporate transformation, oftentimes problems associated with "organizational shifts, not the technology, were the gating factors."[51] In one classic example, we find the British military, having invented both the tank and the aircraft carrier, emerging from World War I with a commanding lead in mechanized land warfare and in naval aviation. However, over the next two decades this early lead was lost to the German Army and to the Japanese and US Navies, respectively, primarily because of organizational barriers that developed in British political and military institutions. Bluntly stated, the US military's strong position in advanced technologies offers no guarantee they will be effectively translated into an enduring source of military advantage. Success requires, among other things, a well-crafted and executed investment strategy.

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[50] To cite but one example, the National Defense Panel, which in 1997 introduced the term "transformation," declared that "we must radically alter the ways in which we project power." The National Defense Panel, *Transforming Defense,* p. 33.

[51] McKenney et al, *Waves of Change,* p. 210.

CHAPTER 3 > STRATEGIC INVESTMENT ELEMENTS

Assume for the moment that those responsible for crafting an investment strategy during a period of discontinuity in the conflict environment enjoy the benefit of a clear vision and diagnosis of the critical elements of the discontinuity, some sense of how it will create new challenges (or opportunities) at the operational level of war, and an idea of how the military plans to meet these new challenges (or exploit prospective opportunities). This information would enable the productive application of various investment strategy tools. Among these tools are: time, hedging, cost-imposition, secrecy (i.e., black programs), outsourcing (i.e., engaging allies), and infrastructure (i.e., the global basing infrastructure). This chapter is devoted to describing and discussing these investment tools.

Before moving on to an elaboration of these tools, a word regarding opportunity costs is in order.

OPPORTUNITY COSTS

The Defense Department incurs costs — human and material — in developing military capabilities to defend the nation. But the Defense Department incurs other costs as well. For example, there are opportunity costs. A dollar can only be invested once. Once invested, either in developing capable service members, equipment, or infrastructure, the Department forfeits the opportunity to invest those resources elsewhere. Furthermore, if the investment is large enough, the Department may find itself "locked in" to a particular capability or set of capabilities, limiting its flexibility at a time when it is badly needed. Historically speaking, as a force element or program develops a certain momentum, it becomes progressively more difficult to abandon it and pursue a dramatically different path. Consider, for example, the Department's only two major program cancellations in recent years: the Army's Crusader artillery system and Comanche helicopter. In terminating these programs, the remaining

projected investment funds for each program were not reallocated to different investment areas. Rather, projected Crusader funds remained allocated to Army field artillery, while the Comanche funds remained with Army aviation. These decisions may have been entirely appropriate. However, this does point out the problems associated with widening the "trade space" across forces and programs to enable resources to be moved to those capabilities that offer the most promise.

Yet a broad trade space is required in periods of discontinuity, when the value of force elements and systems can deviate widely from their historical or even projected utility. Defense leaders must have the freedom to make major investment alterations, as the Royal Navy's Admiral John ("Jackie") Fisher did a century ago when he decommissioned over 150 warships and accelerated the depreciation of Britain's remaining battle fleet in order to fund a revolutionary kind of warship—the HMS Dreadnought—while also accelerating the fleet's exploitation of rapid advances in the submarine's capabilities. Owing to force structure inertia and programmatic momentum (among other things), Fisher encountered stiff resistance from within the Navy, Parliament and even in some industry quarters—Britain's version of today's "iron triangle" of Congress, the military, and industry.[52] Similarly, in May 1942 after the Battle of the Coral Sea, Admiral Ernest King, the Chief of Naval Operations, found he needed to overrule the Navy General Board's recommendations, which accorded priority to continued battleship production. King deferred indefinitely the five battleships the Board recommended, replacing them with five carriers and ten cruisers.[53] Thanks in part to the exigencies of war, King was able to make his dramatic revision in investment priorities stick.

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[52] The conflict within the Royal Navy over Fisher's investment strategy grew so contentious that the Prime Minister himself found it necessary to step in and adjudicate the row between Fisher and his enemies, Admiral Charles Beresford in particular. See Geoffrey Penn, *Infighting Admirals* (Barnsley, South Yorkshire, UK: Pen & Sword Books, 2000), pp. 216–30. Some might argue that the US military drawdown during the 1990s created the opportunity to prepare better for the future. For example, the "600-Ship Navy" of the 1980s was scaled back to 346 ships in the 1993 Bottom-Up Review. However, unlike in Fisher's case, the principal result was not the creation of a different kind of Navy capable of addressing the challenges that emerged in the first decade of the 21st century, but the realization of a "peace dividend." While today's fleet is far more capable of providing large volumes of precision fires than the fleet of the early 1990s, its ability to operate in narrow waters or in the littoral region; to defeat large numbers of antiship missiles; to remove antiship mines quickly; and to conduct reconnaissance and strike operations at extended ranges is suspect. And while the Navy's carrier force has been maintained, overall fleet numbers have declined to less than 300, and there is little prospect of this situation being reversed, given projected budgets.

[53] Chief of Naval Operations to the Secretary of the Navy, 8 May 1942, Subject: 1943–1944 Combatant Shipbuilding Program, 00 Files 1942–47, box 1, folder 1, Naval Historical Center, Washington, DC. When shipbuilding accelerated in 1940, the Navy's planners realized that armor plate production capacity represented the critical bottleneck in expanding the fleet. This led to lighter ships (which could be built more quickly) being given greater priority at the expense of battleship construction. In the end the shortage may have proved serendipitous, arresting as it did the production of the soon-to-be displaced battleships and providing modest encouragement to carrier construction. Chief, Bureau of Ordnance to Director of Budget and Reports, 16 June 1941, Subject: Who Is Behind and Why, SecNav/CNO Confidential File 1940–41, RG 80, National Archives, Washington, DC.

The points to be made here are two. First, in an environment characterized by limited resources, taking a different approach to defense investments typically involves cutting back in some areas so that others can be better resourced. In so doing, some risk has to be assumed. The key is to invest in such a way as to minimize the overall risk to the nation's security. Second, one reason why trade space is so difficult to create is the "program momentum" that develops behind defense investments once they are undertaken. Once a decision has been made to proceed with a program, or once a particular system (e.g., the battleship) becomes an enduring feature on the defense landscape, it becomes progressively more difficult to terminate as centers of support develop behind them in the form of Service subcultures, Congress and industry.

TIME — RESOURCE, COST, WEAPON

Time, while always an important consideration, is especially precious during periods of military discontinuity. Assuming the Department has the resources to affect major shifts in its investment posture, it must still incur a cost in the form of the time it takes to realize the benefits of these investments. As noted above, periods of discontinuous change in military competitions may present those militaries who do not lead the change with insufficient time to adapt.

If the time required to translate resources to capabilities can be compressed, it is possible to apply resources more efficiently.

The longer it takes to produce new capabilities, the higher the risk to be addressed, since there is a lag between the time a discontinuity is diagnosed, the Department's investment strategy altered, and new military capabilities fielded. If, for example, the Defense Department could realize instantaneously the results of a major shift in its investment strategy, it would incur no risk other than that associated with sunk costs — i.e., those capabilities invested in prior to the appearance of a discontinuity, whose value may not hold up well following its occurrence. The longer a military requires to field new capabilities — be they in the form of new systems, doctrine, individual skill sets, or the creation of new infrastructure (e.g., bases) — the greater the risk that it will not be able to respond quickly enough to the new threats emerging from a discontinuity. In brief, the greater the risk, the greater the need for hedging (see below) against that risk. *The inability to compete based on time thus imposes a cost penalty.* The cost here can be thought of in terms of an insurance policy, where the Department invests in a range of capabilities to insure that it is at least minimally competitive if and when a discontinuity occurs. In doing so, however, the Department pays a price — by preparing for a range of futures, it is less prepared for any particular future.

This leads to the key observation that *if the time required to translate resources to capabilities can be compressed, it is possible to apply resources more efficiently.* This is because when hedging against a given level of risk, the ability to operate along short time lines means fewer resources need to be expended. For example, consider the discontinuity in naval warfare that occurred early in World War II, which saw the

aircraft carrier displace the battleship as the capital ship of the world's three principal fleets. Between 1942 and 1945, the United States was able to build over twenty fast carriers and dozens of light and escort carriers.[54] These proved essential to winning the war in the Pacific, and the Atlantic. Had the United States not earlier configured its industrial base and manpower assets to accommodate Admiral Ernest King's rapid shift in investment priorities noted above, it would have been far less effective against the Imperial Japanese Navy following the attack on Pearl Harbor.[55] The alternative to this rapid surge production capability would have been to invest far greater sums prior to the war in producing a series of carrier classes in relatively large numbers in order to be properly prepared,[56] as opposed to the Navy's actual procurement of four carrier classes comprising a total of only six ships.[57]

The ability to exercise this latter investment option is obviously limited to those who have a clear scale advantage over the competition, i.e., a great advantage in resources. Historically this has not been the case, even for great powers. Yet the United States does enjoy such an advantage over its adversaries today. This ability to pursue a "rich man's" investment strategy, while it may work in a number of instances, is certainly not an efficient use of resources. It speaks more to institutional laziness than to thoughtful investment strategies. Better to pursue a "smart man's" strategy, especially when discontinuities, which often breed surprise, are involved.[58] This is

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54 By the spring of 1945 the United States Navy had a total of 88 carriers in commission, with an additional 25 under construction and over 30 more on order. At the time, 26 fast carriers were operating in the fleet. Norman Polmar, *Aircraft Carriers* (Washington, DC: Potomac Books, 2006), p. 495.

55 To be sure, decisions were made to begin procuring carriers and other warships in large numbers prior to the United States' entry into the war, especially following the collapse of France in the west and Japan's move on Southeast Asia in the east. The first 11 *Essex*-class carriers were ordered between July 3 and September 9, 1940. The *Montana*-class battleships were ordered on 9 September 9, 1940. See James C. Fahey, *The Ships and Aircraft of the United States Fleet, Two-Ocean Edition* (Annapolis, MD: US Naval Institute, 1941.

56 Pre-discontinuity uncertainty can also be reduced through such means as a thorough diagnosis of the future competitive environment, which can be translated into clear guidance for strategic planners in the form of key challenges and opportunities at the operational level of war. As noted above, this process has proven difficult for the Defense Department.

57 Through the late 1930s the Navy produced the *Langley,* a converted collier; then the *Saratoga* and *Lexington,* both converted battle cruisers; then the *Ranger;* and next the *Yorktown* and *Enterprise*. Thus the Navy had produced four classes of carriers, each quite different from the others, but only six ships in all.

58 There are limits to what the United States' scale advantage can do in the absence of an ability to surge production. No example could be clearer than the Army's $50 billion-plus shortfall of equipment as the result of ongoing operations in Afghanistan and Iraq. Most units not in the combat zone are short a number of key equipment items. This reduces these units' ability to train effectively, and creates risk that, in the event another contingency emerges, they will deploy with substantially less than their full equipment kit. Ann Scott Tyson, "U.S. Army Battling to Save Equipment," *Washington Post,* December 5, 2006; and Ann Scott Tyson, "Military is Ill-Prepared for Other Conflicts," *Washington Post,* March 19, 2007.

especially warranted given the more rapid economic growth enjoyed by several rising powers, to include China and India, relative to the United States.[59]

The ability to compete based on time can also be used as a weapon. If DoD's defense planners can wait longer before committing resources, it complicates adversaries' investment strategies, since they have less information regarding the ultimate investment path the Department might take. It is somewhat similar to a game of poker, in which the adversary must begin to reveal his hand, card by card, while we continue to conceal ours. We have a much better sense of the risks and opportunities we face relative to the opponent, and (assuming we can exchange unexposed cards through a request to the dealer) a much greater opportunity to shift our competitive posture. The difference, of course, is that *the Department can decide what cards it will be dealt,* since it can choose where to invest.

If DoD's defense planners can wait longer before committing resources, it complicates adversaries' investment strategies, since they have less information regarding the ultimate investment path the Department might take.

An investment strategist's ability to employ time-based competition as a weapon has another advantage. For example, through its superior command of money, agile and technically advanced industrial base, and the leadership of Admiral Fisher, the Royal Navy aggressively employed time-based competition against its rivals a century ago in order to maintain its dominant position at sea. This approach to investment strategies was enabled by rapidly advancing technologies that led to a discontinuity in the maritime competition.[60] According to Admiral Fisher, by launching ships that were substantially superior in quality to anything then afloat the Admiralty could compel other navies to reconsider their own ship-building plans. Equally important, if the Admiralty's plans were not revealed until the last possible moment, the disarray produced among Britain's rivals could enable the Admiralty to slow its own naval construction program, providing economies to the naval estimates. The "whole secret" of successful naval administration, Fisher concluded, "is 'plunging' — it stupefies foreign Admiralties."

> [P]ut off to the very last hour the ship (big or little) *that you mean to build* (or perhaps not build her at all!). You see all your rival's plans fully developed, their vessels started beyond recall, and then in each individual answer to each such rival vessel you *PLUNGE* with a design 50 per cent. better! knowing that your rapid shipbuilding and command of money will enable you to have your vessel fit to fight as soon if not sooner than the rival vessel.[61]

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[59] For example, see Ronald L. Tammen and Jacek Kugler, "Power Transition and China-US Conflicts," *The Chinese Journal of International Politics,* Vol. 1, 2006, p. 35.

[60] A century ago, the range and reliability of torpedoes was increasing at an incredible rate relative to progress over the previous decades. Submarines capable of patrolling at extended ranges were on the horizon. The range of surface warship gunfire was increasing dramatically. Wireless and transoceanic communications cables were enabling much more effective coordination at the strategic level of warfare. Efficient, reliable turbine engines were being introduced. All in all, it was a period of remarkable naval innovation.

[61] Nicholas A. Lambert, *Sir John Fisher's Naval Revolution* (Columbia, SC: University of South Carolina Press, 1999) p. 246. The cite here is, in fact, Fisher's. The admiral was prone to violate the rules of grammar in his desire to convey his enthusiasm.

Note Fisher's emphasis on "rapid shipbuilding" and the need for flexibility in redirecting investments ("command of money") to enable "plunging," his term for exploiting time as a key investment weapon during periods of military-technical discontinuity. As Fisher argued in 1904, the ability to compress investment timelines is critical to an investment strategy in periods of discontinuity. It can enable investment costs to be reduced dramatically, as the need to hedge is reduced. At the same time, it can also heighten the uncertainty under which competitors must plan, reducing the effectiveness of their investment strategies. To be sure, it is not practical to eliminate risk and uncertainty from the investment strategist's planning, but it is possible to reduce their effects significantly through time-based competition.[62]

Unfortunately, for a variety of reasons, the Defense Department is not well positioned to compete based on time. To be sure, there are efforts under way to field systems with "open architectures" that will allow for rapid reconfiguration. One example of this is the Navy's Littoral Combat Ship (LCS), which is being designed to incorporate different modules to deal with submarines, mines, or small surface boat "swarm" attacks. Unfortunately, the ship is being submerged by the Pentagon's acquisition process, and although the ship was conceived of roughly a decade ago, it remains unclear when the fleet will receive these ships in significant numbers. The same can be said of the F-35 fighter, scheduled for the Air Force, Marine Corps and Navy. Like the LCS, the F-35 is intended to have an open architecture that will facilitate avionics upgrades. However, also like the LCS, the F-35, which has been in development for over a decade, will not likely appear in large numbers for another decade.[63] The Defense Department's decision to produce thousands of Mine Resistant Ambush Preventive (MRAP) vehicles for operations in Afghanistan and Iraq is yet another example. These vehicles are designed to protect troops from improvised explosive devices (IEDs) that have become an increasingly popular weapon for insurgent forces in both countries. While the problem became apparent as early as July 2003, it took nearly four years for the Pentagon to provide troops in the field with what is generally considered to be an "off-the-shelf" countermeasure.

Given the importance of this aspect of investment strategy—especially during periods of anticipated discontinuity in the military competition—high priority should be accorded to improving dramatically the Department's capability in this area. This

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[62] George Stalk, "Time—The Next Source of Competitive Advantage," *Harvard Business Review,* July–August 1988, pp. 44–45. Stalk presented the classic case of the "Honda-Yamaha Motorcycle War" to demonstrate the importance of time-based competition in a highly dynamic competitive environment. Yamaha initiated the war in 1981 when it announced the opening of a new factory that would make it the world's largest manufacturer of motorcycles. Honda responded by cutting prices, flooding distribution channels and increasing advertising. Most importantly, Honda dramatically increased the rate of change in its product line, introducing or replacing 113 models over the next 18 months, as against 37 changes for Yamaha. By providing a wide variety of motorcycles, Honda was able to address a wider range of consumer preferences, Honda then devastated Yamaha's market position, and won the "war."

[63] John A. Tirpak, "The F-35 Steps Out," *Air Force,* April 2003, accessed at http://www.afa.org/magazine/april2003/0403F35.asp. Accessed on May 18, 2008.

implies a commitment to reforming the acquisition system, something no one has been able to improve appreciably for at least a generation. Unless the Department can make some major improvements in its defense acquisition process — changes that Congress, the defense industry, and the Services may oppose vigorously — the Department's ability to exploit time-based competition will be far below its potential.

HEDGING AGAINST RISK AND UNCERTAINTY

The less able the Department is to compete based on time, the more it must hedge against risk and uncertainty. This is particularly true in periods of discontinuity in the military competition, when risk and uncertainty are relatively high when compared to periods characterized by evolutionary change. As the Department's ability to exploit time is limited, substantial risk remains. Thus the question arises as to how to deal with residual risk.

Investment strategies must balance the need to prepare for future challenges, to include those that may arise from a discontinuous shift in the military competition, with the need to maintain a sufficient level of existing military capability to address immediate challenges to the national security. However, investments in near-term capabilities must also be made with an eye toward their long-term relevance, as some defense capital stock declines precipitously in value during periods of discontinuous change. For example, the major powers' armies in 1914 all contained substantial horse cavalry formations, which were considered a key element in the combined arms warfare that also included infantry and artillery. Yet the war saw mounted cavalry increasingly marginalized. Following the war, the advent of mechanized ground warfare saw the horse cavalry relegated to history's dustbin. Similarly, the rise of naval aviation and fast carrier task forces within a period of months during World War II totally eclipsed the battleship's primacy as arbiter of naval supremacy. To be sure, history shows that many existing capabilities — sometimes referred to as "legacy" capabilities — survive a discontinuity, although they may find their value diminished somewhat and their role altered.[64] Moreover, just because a new capability is identified does not mean that it is, to use DoD's current terminology, "transformational." That is to say, every new weapon concept or force design does not necessarily represent an improvement, let alone a major leap, in military effectiveness. The difficult challenge of identifying "winners and losers" among existing and prospective capabilities again highlights the value of making a good diagnosis of the post-discontinuity competitive environment, in the form of a clear statement of challenges and opportunities at the strategic and

Every new weapon concept or force design does not necessarily represent an improvement, let alone a major leap, in military effectiveness.

[64] Consider, for example, the discontinuity that led to the battleship's displacement by the carrier. Other warships — cruisers, destroyers, and submarines — retained much of their value. Their role in the fleet did change, however, and in some instances it changed significantly. Destroyers, for example, found themselves providing air defense support from enemy air attack. This was quite different from their earlier role as a screening force for the battleship line of battle.

operational (or campaign) levels of war. A good investment strategy must account for these phenomena.

"Lock In" and "Wildcatting"

Two key elements of an investment strategy designed to deal with relatively high levels of risk and uncertainty are "lock-in" avoidance and "wildcatting." During periods characterized by discontinuous change in the military competition, investment strategists should avoid, consistent with near-term requirements and to the maximum extent possible, "locking in" investments. The fewer new capabilities that need to be purchased in large quantities, the more resources that will be available to hedge against an uncertain future, and the more flexibility there will be to shift investment priorities when the threat materializes (i.e., when the discontinuity occurs). The objective here is to minimize serial production runs of long-life capital stock, while emphasizing buys of a wider range of capabilities with shorter-life spans, or open-architecture capital stock.[65] An example of the "locking in" problem can be seen in the case of the *Luftwaffe's* decision to concentrate on two-engine bombers in the years leading up to World War II. While these bombers had sufficient range to strike effectively at Germany's immediate targets, France and Poland, they proved inadequate when confronted with the problem of conducting longer-range operations against Great Britain during the Battle of Britain and, later, against the Soviet Union.[66]

Again, the example of the US Navy during the interwar period (i.e., the period between the world wars) is instructive. For much of that period the Navy did not fund a single new battleship. Of course, at that time the United States pursued a policy of neo-isolationism, the threat to national security was considered quite low, and the nation had signed the Washington Naval Treaty.[67] Thus the nation felt comfortable (especially during the Great Depression years of the 1930s) in indulging itself in a "battleship holiday" of sorts. Those countries facing active challenges to their security, such as Great Britain during Fisher's tenure as First Sea Lord (1904–1910), could not

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[65] Again, as noted earlier in this report, open-architecture capabilities can be rapidly reconfigured to address different missions. Recall the US Navy's Littoral Combat Ship (LCS). The LCS is designed to be able to swap out several different mission modules (e.g., anti-submarine warfare, counter-mine, and counter-swarm). The ship is also designed to accept improvements in its electronics suite with minimal need for reconfiguration. See http://www.globalsecurity.org/military/systems/ship/lcs.htm. Accessed on May 18, 2008.

[66] The *Luftwaffe,* confronted with limited resources, a shortage of raw materials and difficulties in producing adequate engines, cancelled both of its long-range heavy bomber prototypes in 1936, and instead concentrated on medium bombers such as the Junkers-88, Heinkel-111, and Dornier-17. Williamson Murray, "Strategic Bombing: The British, American and German Experiences," in Williamson Murray and Allan R. Millett, eds, *Military Innovation in the Interwar Period* (Cambridge, UK: Cambridge University Press, 1996), pp. 132–33.

[67] The Navy had plans for a major battleship building program as World War I came to a close. However, the Washington Naval Treaty of 1922 severely limited battleship construction. Although extensive conversions were made to existing battleships, the United States built no new ones until the keel of *North Carolina* was laid in October 1937, after the treaty had expired in December 1936.

afford such a holiday. The Royal Navy had to upgrade the fleet constantly to meet the ongoing challenges posed by France and Russia, and later Germany. Fisher's solution was to produce small classes (or "short production runs") of ships to minimize the impact of their rapid devaluation, while also exploiting rapid advances in technology to shift the military competition in ways favorable to Great Britain. He also ruthlessly scrapped every ship he felt was of little military value, even though some may have had considerable hull-life left in them.[68]

While investment strategists should beware of "locking in" to capabilities that may decline dramatically in value long before their useful lifespan is exhausted, they should accord increased emphasis to "wildcatting" during periods characterized by discontinuities in the military competition. Wildcatting involves buying *access* to a wide range of new capabilities in operationally significant numbers that can serve as *options* to be exercised if and when it becomes appropriate. These capabilities represent a portfolio of sorts. A common characteristic among these capabilities is their potential to make a major contribution in either bringing about a discontinuity (i.e., exploiting a potential opportunity at the operational or strategic level of warfare), or enabling the military to compete effectively in response to a discontinuity (i.e., meeting a very different challenge at the operational or strategic level of warfare) in the competitive environment.[69]

Thus, for example, Jackie Fisher's introduction of the HMS *Dreadnought* threatened to upset the maritime military balance. The Royal Navy's move to this all-big-gun warship, powered by newly introduced turbine engines and enabled by advances in gunnery and (what was believed to be) effective range-finding equipment, theoretically enabled "dreadnoughts" to enjoy both superior mobility and the capacity to engage the enemy at extended ranges.[70] A rough analogy today might be the proposed shift toward extended-range precision engagements in the contemporary US military.[71]

The fullest expression of Fisher's revolution in terms of surface combatants came in the form of the fast battle cruisers, which sacrificed armor protection in order to maximize speed through use of the turbine engines, and firepower from their all-

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[68] Fisher decommissioned 154 ships, which he described as ships that could neither fight nor run away (i.e., advances in technology were rendering these ships inferior in both firepower and mobility). Paul M. Kennedy, *The Rise and Fall of British Naval Mastery* (London: Allen Lane, 1976), pp. 216–217.

[69] But wildcatting, as the term implies, also runs the risk of investing in "dry holes," systems or capabilities that simply fail to pan out. Again, that is part of the "insurance premium" that must be paid, especially by those organizations that cannot compete effectively based on time.

[70] For a detailed discussion of Fisher's so-called Dreadnought Revolution, particularly as it relates to extended-range fleet engagements, see Jon Tetsuro Sumida, *In Defence of Naval Supremacy* (Boston: Unwin Hyman, 1989).

[71] For instance, the Army, in its efforts to transform, sums up the effort as one which will enable its forces to "see first, understand first, act first, and finish decisively." The Navy, in Operation Enduring Freedom, demonstrated the capability to do something that Admiral Fisher could hardly have dreamed of: extended-range, precision strikes by maritime forces against a *landlocked* country.

big-gun design.[72] It is worth noting that the Royal Navy also hedged by continuing to produce dreadnought battleships (again, in small runs to avoid locking in), and by increasing its investments in submarine development.

Similarly, the US Navy was able to address successfully the discontinuity in naval warfare introduced by the Imperial Japanese Navy's carrier divisions in World War II, in large part because it had wildcatted in its development of America's naval aviation arm. In the early 1930s, Navy visionaries like Admiral William Moffett, head of the Service's Bureau of Aeronautics, argued that "it appears that 14,000 tons approaches the upper limit of displacement which should be considered for carriers of the future."[73] Despite this, however, between its first experimental carrier, the USS *Langley* (a converted collier recommissioned in 1922) and 1940, the Navy authorized four classes of carriers, each with *significantly different displacements and operating characteristics*. The single-ship Ranger-class displaced roughly 17,500 (full load), the two-ship Lexington-class *(Lexington* and *Saratoga)* 36,000 tons, the three-ship Yorktown-class *(Yorktown, Enterprise, Hornet)* 25,500, and the single-ship *Wasp* class 19,000 tons.[74] During this period the Navy also wildcatted in developing different carrier air strike options, including horizontal bombing, torpedo attack, and dive bombing.[75]

The virtue of the Navy's wildcatting efforts is borne out by the fact that the Essex-Class carriers, which were the first carriers commissioned after the Battles of Coral Sea and Midway in December 1942, and the first to be produced in large quantity, displaced 35,000 tons—two-and-a-half times the optimal size first envisioned by Navy aviators. Indeed, although the Navy had rejected the Lexington-class as far too large, the follow-on to the Essexes, the Midway Class, came in at 60,000 tons. With the move toward larger carriers, both the *Ranger* and *Wasp* were considered too light

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[72] Large guns of a uniform caliber ("all big gun") were first introduced on the *Dreadnought*. They conferred two advantages: first, they outranged many of the guns on rival battleships with mixed armaments; second, they aided rangefinding by the simple fact that they were all of the same caliber.

[73] William F. Trimble, *Admiral William A. Moffett, Architect of Naval Aviation* (Washington, DC: Smithsonian Institution Press, 1994), p. 205. The *Saratoga* and *Lexington* were constructed in part as an economy measure. They were the product of a conversion of partially constructed battle cruisers, which was permitted under the Washington Naval Treaty. Moffett's rationale was influenced by a number of factors, including arms control limitations. For an excellent history on the development of the US (and British) carrier aviation arm, see Thomas C. Hone, Norman Friedman and Mark D. Mandeles, *American & British Aircraft Carrier Development* (Annapolis, MD: Naval Institute Press, 1999).

[74] Norman Friedman, *US Aircraft Carriers: An Illustrated Design History* (Annapolis, MD: Naval Institute Press, 1983), Appendix E, Carrier Characteristics, pp. 388–94.

[75] Again, no small element of serendipity was involved in the Navy's success. For example, converting the Saratoga and Lexington from battle cruisers to carriers was promoted by the Washington Naval Treaty, which permitted the conversion. As the treaty also limited the tonnage of US carriers to 175,000 tons, there were those in the Navy who argued against "sinking" so much of the fleet's allotted carrier budget into only two ships. Consider also that the Navy believed that torpedoes were much more lethal to ships than bombs, and hoped that dive bombers would draw off enough of an enemy's carrier defenses to enable the torpedo bombers to be effective. Ironically, the opposite occurred at the Battle of Midway, which confirms the importance of buying capability options in addressing critical mission requirements. The author is indebted to Robert Work for this insight.

for the Pacific. However, the *Wasp* was transferred to that theater in 1942 during the early desperate months of the war, and she was sunk while enroute to Guadalcanal in September 1942. The *Ranger* served in the Atlantic until late in the war, when she transferred to Hawaii to serve as a training carrier for night fighting squadrons. These two ships helped prove the value of small carriers in providing air cover for convoys or small dedicated air groups (e.g., for close air support or night fighting). Both might be seen as the first "escort carriers." Thus, US Navy carrier wildcatting produced important results on both ends of the carrier spectrum.

Wildcatting also serves other useful functions. For one, it helps ensure both the development and the health of the defense industrial base, for example, by maintaining a robust design capability within the industrial base, the importance of which can hardly be overestimated.

By enabling the fielding of new capabilities in small but *operationally significant* quantities, wildcatting also facilitates the development of new military doctrine, and a cadre of trained personnel that can be drawn upon if and when the need to scale up production of these capabilities becomes warranted. As these capabilities are tested through war games, simulations, and — most importantly — field/fleet exercises, the level of uncertainty under which investment strategists must operate is reduced, since the military is able to obtain a much better understanding of how both emerging and legacy systems and capabilities can best be combined to create (or adapt to) a discontinuity. Indeed, field/fleet exercises can provide important signals for those militaries seeking to identify when the threshold of a discontinuity has been reached, as well as the form it will take. Consider, for example, that in February 1932 (and on the seventh day of the month, which was a Sunday, no less), the US base at Hawaii was subjected to a surprise "attack" by an "enemy" carrier force commanded by Rear Admiral Harry Yarnell as part of a US Navy fleet problem. The exercise demonstrated the potential of carrier-based aviation and the vulnerability of the US military facilities on Hawaii to surprise attack from the air.[76] In this way wildcatting and field/fleet exercises help reduce military-technical uncertainty, thereby enabling strategic planners to create and validate more options. Wildcatting also positions the Department either to exploit with relatively high confidence a prospective discontinuity, or to exercise options along reduced timelines should the discontinuity be introduced by another military.[77]

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[76] Thomas Wildenberg, *Destined for Glory* (Annapolis, MD: Naval Institute Press, 1998), pp. 95–96. For a discussion of the role exercises play during periods of military revolution, or discontinuity, see Andrew F. Krepinevich, *Lighting the Path Ahead: Field Exercises and Transformation* (Washington, DC: Center for Strategic & Budgetary Assessments, 2002).

[77] Unfortunately for the United States, the lessons of Admiral Yarnell's attack were not sufficiently absorbed by the Navy to preclude the successful Japanese surprise strike on Pearl Harbor on Sunday, December 7, 1941.

"False Starts and "Dead Ends"

Wildcatting confers other benefits to an investment strategy during periods of high uncertainty. It helps to identify promising capabilities whose value has been oversold. Consider that in periods of discontinuous change, or transformation, military organizations run the risk of buying large quantities of a promising system too early, before the capabilities that will prove "transformational" are incorporated. The risk of committing to such a "false start" was demonstrated in the US Navy's affection for its first carrier designed from the keel up, the *Ranger,* which was commissioned in 1934. Although some Navy leaders had pressed for construction of five Ranger-class carriers, war game analysis and fleet problems soon indicated that, at roughly 14,000 tons, as discussed in the previous section, the *Ranger* was far too small to meet many of the demands of future fleet operations. As it turned out, the Essex-class carriers that formed the backbone of the Navy's fast carrier task forces in World War II each displaced over twice as much tonnage as the *Ranger*.

Investment strategists must not fall into the trap of assuming that every new capability that is advertised as "transformational" will prove out.

The US Navy has not been alone in facing the problem of false starts. Admiral Fisher found, somewhat to his dismay, that the extended-range engagement capability of his dreadnought and battle cruiser line of battle was substantially overestimated, owing to major problems with gunnery accuracy at long range. A solution to this problem would have to await the arrival of the first, primitive aircraft carriers in the late 1910s. It was their aircraft, and others assigned to the fleet, that would provide the required accuracy for extended-range fires that Fisher sought.[78] Just as investment strategists must beware of locking in to large production runs of legacy capabilities, they must also not fall into the trap of assuming that every new capability that is advertised as "transformational" will prove out.

Then there are those military systems or capabilities that appear promising, or even revolutionary, that fail to live up to expectations. In this case, the challenge of Defense Department investment strategists is not to avoid buying these capabilities too early, as in the case of false starts; rather, it is to avoid buying them *at all*. The experience of the US Navy in developing naval aviation in the interwar period provides an example of how rigorous experimentation and field exercises can help avoid these "dead ends." In 1930, the Navy's Bureau of Aeronautics proposed constructing eight 10,000-ton flying-deck (or flight-deck) cruisers. The ships — half cruiser and half flight deck — were subjected to war game analysis at the Naval War College and to some experiments employing surrogates in the fleet. Both painted a distinctly unfavorable picture of the hybrid ship, and it quickly sank beneath the Navy's programmatic

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[78] In fact, the US Navy became enamored of the carrier in part because of tests conducted in March 1919 in which aerial spotting enabled the battleship *Texas* to improve its accuracy "many times better than was done by ship's spotters." CO, USS Texas, ltr to CincLant Flt dtd March 10, 1919, read into the General Board Hearings, 1919, p. 926. Cited in Charles M. Melhorn, *Two-Block Fox* (Annapolis, MD: Naval Institute Press, 1974), p. 37.

waves.[79] Other examples of dead-ends include the US Navy's brief flirtation with airships during the interwar period, and the Royal Navy's attempt during the 1890s to employ torpedo boat destroyers as a means of coping with the torpedo boat threat in narrow waters.[80]

While wildcatting offers benefits, it also imposes costs that must be taken into account. For example, under the Department's current way of doing business, defense companies make their money out of long production runs, not "one-off wildcatting" or "keep-it-on-the-shelf" R&D developments. Moreover, the operations and maintenance (O&M) costs associated with small production runs of different classes of any given weapon type will also be substantially higher. Thus, the benefits of wildcatting must also be balanced with the need to periodically recapitalize the military and maintain the health of the defense industrial base. In short, there is a price to be paid for increasing the emphasis on wildcatting—but there is a price to be paid for ignoring it as well. The question becomes one of how best to balance the advantages of hedging against uncertainty by investing in capability options, with the need to modernize the force periodically as equipment wears out, and to contain costs. Alas there is no clear-cut recipe for how to identify the "sweet spot" combining a mix of scale production with the need to hedge. This is where senior Defense Department leaders' judgment comes into play. One would expect that hedging investments would comprise a significantly greater portion of the Department's investment portfolio today then during the late Cold War period, for example. However, this does not appear to be the case.

Skipping a Generation

Early in the administration of President George W. Bush, the Department attempted to take hedging into account in developing investment strategies. This effort partly stems from a speech given in 1999 by then-Governor Bush, which attracted a great deal of attention when he declared that the United States should

> modernize some existing weapon systems and equipment necessary for current tasks. But our relative peace allows us to do this selectively. The real goal is to move beyond marginal improvements—to replace existing programs with new technologies and

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[79] The continued rapid advance of aviation technology proved fatal to the flying-deck cruiser concept. The ships' runways were simply too short to accommodate new aircraft, with their increasingly powerful engines.

[80] The British introduction of torpedo boat destroyers (the ancestor of today's destroyers) was stimulated by a discontinuity in the military competition that occurred as a consequence of the maturation of antiship mine and torpedo technology, which made close blockade of enemy naval bases (the preferred Royal Navy option for establishing control of the seas) very hazardous. The torpedo boat destroyers were intended to enable the close blockade to prevail. They failed, and the result was the gradual shift toward a distant blockade, which was imposed by the Royal Navy on Germany during World War I.

> strategies: to skip a generation of technology. . . . I intend to force new thinking and hard choices.[81]

The president's call to "skip a generation" of weapon systems in order to both better prepare for newly emerging challenges to national security, and to exploit the potential of rapidly advancing military-related technologies is consistent with a modernization strategy during a period of military revolution, or discontinuity, which should emphasize wildcatting while avoiding locking in to large production runs wherever possible. Skipping a generation makes sense under the following conditions:

- *When the near-term risks to national security are relatively low, thus reducing the need to procure large numbers of incrementally improved systems.* Even given the ongoing conflicts in Afghanistan and Iraq, this is currently the case. The United States is not in an arms race with any significant hostile power as it was, for example, during the Cold War with the Soviet Union. The Cold War military competition was immediate, intense, and conducted on a grand scale. Even incremental Soviet improvements in weapon systems such as tanks, combat aircraft and submarines could have made an important difference in the military balance. At present, no rogue state or combination of rogue states, such as Iran and North Korea, comes close to posing the kind of existential military challenge the Soviet Union represented to the United States. Correspondingly, no likely near-term US adversary is even developing, let alone producing, large quantities of advanced versions of Cold War-era military staples such as main battle tanks, advanced jet fighters, or nuclear-powered aircraft carriers.

- *When incremental modernization yields an improved version of a current system (or capability) within the current operational regime that will actually see its effectiveness decline, quite likely precipitously, because of coming changes in the threat environment.* For example, modern battleships at the time of Pearl Harbor were unquestionably superior to the world's best battleships at the end of World War I. However, with the rise of naval aviation and the advent of the fast carrier task force, the relative effectiveness of the battleship as the final arbiter of sea control declined dramatically. Thus while investments made during the interwar period to improve the performance of battleships were a success, they ultimately proved irrelevant. A contemporary example might explore the long-term fate of large, expensive satellites operating in low-earth orbit (LEO). As the recent Chinese anti-satellite (ASAT) test demonstrates, these satellites may prove highly vulnerable to destruction. Moreover, the US military's heavy reliance on its satellites to support a wide range of missions may make attacking them an irresistible temptation for future adversaries with ASAT capabilities. If a follow-on generation of satellites can

[81] See George W. Bush, "A Period of Consequences," Speech at The Citadel, South Carolina, September 23, 1999, available at http://citadel.edu/r3/pao/addresses/pres_bush.html.

be fielded that greatly reduces these risks, it would seem prudent to explore this option vigorously.

> *When the opportunity exists to exploit rapidly advancing technology to produce military capabilities that represent major leaps in effectiveness over current capabilities, as opposed to evolutionary improvements, or advances that promise only marginal improvements in military effectiveness.* Rapid advances in information-related technologies may enable US forces to operate as part of a distributed battle network that significantly increases their effectiveness while decreasing their vulnerability (owing to greater dispersion). Others describe what they see as rapid advances in the biosciences, robotics, directed energy, and nanotechnology to argue that warfare is entering an age of rapid shifts in the character of the military competition—a series of overlapping discontinuities. A strong case can also be made that the United States' adversaries are vigorously attempting to change the character of their military competitions with the United States. Fortunately, the Defense Department is aggressively pursuing research and development in many of these technologies. The question remains, however, as to whether developing and fielding capabilities emerging from these technologies can be done at a quick enough pace to keep up with the competition.

A hedging strategy should avoid locking in to either legacy or emerging capabilities.

To sum up, an investment strategy during a period of military discontinuity should accord a high priority to hedging against the high levels of risk and uncertainty that characterize such periods. The more effectively the Department can compete based on time, the lower the risk it need incur and, hence, the less of a need there is to hedge. Experimentation, particularly through field/fleet exercises, also provides a means for reducing risk and uncertainty, thereby enabling more effective use of limited investment resources. To the maximum extent possible, a hedging strategy should avoid locking in to either legacy or emerging capabilities. With respect to the latter, it is important to recognize the dangers of false starts and dead ends, and the value of wildcatting. To the extent wildcatting enables field/fleet exercises at the operational level of war, it helps the Department buy options, or insurance, against an uncertain future, thereby reducing risk. Perhaps the ultimate expression of avoiding lock-in is to skip a generation of legacy systems as a means of avoiding in-kind replacement during a period of discontinuous change. Finally, it should be noted that the United States, with its enduring scale and technical advantages, can employ wildcatting to impose costs on its rivals by simply broadening its options portfolio, thereby complicating adversaries' planning by increasing their risk and uncertainty regarding what options the Department will ultimately exercise.

Cost-Imposing Strategies

Cost-imposing or competitive strategies are *not* designed to optimize the effectiveness of US forces themselves.[82] Rather, they are intended to influence the investment strategies of adversaries in ways favorable to the United States. Cost-imposing strategies can take two forms. The first involves encouraging a competitor to continue down a path (i.e., to sustain investments) that it is already taking—a path that is relatively benign in terms of the comparative advantage it provides to the United States. The second form is to impose costs by convincing a competitor that it must divert resources (i.e., open up a new investment path) to address a new challenge posed by the United States.

Cost-imposing strategies involve aligning one's enduring strengths against the target's enduring weaknesses.

In their basic form, cost-imposing strategies involve aligning one's enduring strengths (e.g., those pertaining to economic scale, technology, geographic position, political and strategic culture, demographics, etc.) against the target's enduring weaknesses. The focus on enduring strengths and weaknesses has two advantages. First, it facilitates efforts to sustain a strategy over a protracted period of time. This is especially important now, as the identity of at least some of the principal enduring challenges to US national security (e.g., radical Islamists; nuclear proliferation; growing Chinese power) are known—even if their long-term methods of competition are far less certain. Second, it makes it difficult for the target to develop counter- or offsetting strategies.

One example of a cost-imposing strategy concerns the Royal Navy's decision to construct the *Dreadnought,* the first modern battleship. Owing to its advanced design and dramatically increased firepower, *Dreadnought* had a substantially larger beam than her predecessors. This posed no particular problem for the British; however, it presented an unpleasant dilemma for Britain's principal naval rival, Germany. This is because the Germans relied on the Kiel Canal that cut through the Danish peninsula to reduce substantially the time it took to shift their fleet between the Baltic and North Sea, to counter a threat from Russia, or from Britain or France, respectively. For the Germans to build battleships on the *Dreadnought's* scale, they would either have to incur the great expense associated with redigging the Kiel Canal to accommodate ships with the *Dreadnought's* wide beam, or run the risk of having the fleet arrive too late to deal with an enemy's naval armada. In short, the British exploited (unintentionally, as it turned out) an enduring weakness of Germany—its geographic circumstance—in order to impose severe costs in a way that added little to Berlin's competitive position.

A second example of a cost-imposing strategy at work is the use of the US long-range bomber force during the Cold War to impose costs on the Soviet Union in

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[82] The impetus behind the development of cost-imposing, or "competitive" strategies in the Defense Department has been Andrew W. Marshall, director of the Office of Net Assessment in the Office of the Secretary of Defense. See A.W. Marshall, *Competitive Strategies: History and Background* (Unpublished paper, March 1988).

the form of vast investments in its air defense network.[83] Here the United States exploited the Soviet Union's long borders and propensity to invest in active defenses to impose costs. By incentivizing the Soviets to continue pouring resources into their air defense systems, the United States effectively pushed the competition between the two powers in a highly favorable direction. The result was substantially fewer Soviet resources available for more threatening military capabilities (e.g., nuclear forces, tank armies).

Interestingly, as in the case of the US bomber fleet and the Soviet Union, there was no direct attempt to change the costs or reduce the benefits of the military capabilities that were the targets of the cost-imposing strategy. The Soviets, for example, did not incur additional costs to build more threatening capabilities (e.g., ballistic missiles or tank armies), nor did the United States take steps to reduce their anticipated effectiveness. Similarly, the Admiralty did not directly reduce the cost associated with German construction of *Dreadnought*-like ships, or reduce their effectiveness as a fighting platform. What *did* occur, in both cases, was the imposition of costs in an area the adversary felt compelled to address, thereby reducing the resources available to invest in more threatening capabilities.

Cost-imposing investment strategies often appear to be more the product of serendipity than design.

A contemporary example of cost-imposing strategies concerns the effects of the September 11, 2001 attacks on New York and Washington. These attacks, which cost al Qaeda perhaps a few million dollars to mount, imposed enormous costs on the United States. While estimates vary, it is safe to say that funding for US homeland defense has increased by at least several tens of billions of dollars since the attacks, yielding an astounding cost-exchange ratio of some 10,000:1 or better. Here al Qaeda exploited enduring US weaknesses in the form of its long borders, lax border controls, open society and civil liberties (e.g., right to privacy, freedom from unreasonable search and seizure) to infiltrate its agents into the United States, study the US airport security system, and plan their hijacking.[84] Al Qaeda also exploited an enduring source of advantage in the form of followers willing to commit suicide in order to convert an airliner into a precision-guided weapon.

Interestingly enough, cost-imposing investment strategies often appear to be more the product of serendipity than design. There is little evidence that Admiral Fisher intended to exploit Germany's geographic dilemma when he decided to proceed with the *Dreadnought*. Nor is there any substantial body of evidence that US Air Force planners were hoping to exploit the Soviet Union's long borders and enduring institutional

[83] For examples of cost-imposing strategies inspired by Marshall's Office of Net Assessment, see Department of Defense, *Annual Report to the Congress, FY 1987* (Washington, DC: US Government Printing Office, February 1986), pp. 85–88; and Department of Defense, *Annual Report to the Congress, FY 1988* (Washington, DC: US Government Printing Office, January 1987), pp. 65–69.

[84] Of course most Americans view their open society and civil liberties as strengths, not weaknesses. However, in the 9/11 attacks, they were clearly exploited by the enemy. Moreover, these are enduring US weaknesses in the sense that Americans are willing to pay a very high price—now over $50 billion per year—to defend both their physical security and their way of life.

priority to air defense (through PVO Strany) in their decisions regarding the bomber force. It was only after the fact that the benefits of these inadvertent cost-imposing investment strategies were identified. The challenge for the Defense Department, then, is twofold: first, to move beyond serendipitous competitive strategies; and second, to identify ways to defeat rival attempts at pursuing effective competitive strategies against the US. Finally, in an era of relatively high uncertainty, strategies that can draw upon enduring sources of strength and weaknesses have a particularly great appeal, and should be pursued.

Complexity and Diversity

Investment strategists exploring opportunities to impose costs on adversaries might also achieve their aims by inducing risk and uncertainty into an adversary's calculations. This can be accomplished through pursuing an investment strategy that exploits complexity and diversity. This strategy is particularly attractive during periods of discontinuity (or anticipated discontinuity) in the military competition, where uncertainty is already high. The problem posed to the adversary here, again, is not directly linked to its investment calculations concerning perceived costs and benefits. The adversary experiences no direct impact on its cost to field a given set of military capabilities. Rather, as in the case of competitive strategies the imposed costs are indirect.

How is an investment strategy of complexity and diversity pursued? First, it helps to have certain enduring advantages. A competitor like the United States has an enduring advantage in both the scale of its defense effort and the technological sophistication of its defense industrial base. The United States has no rival (or combinations of rivals) that can muster even half the US gross domestic product (GDP). Moreover, the United States can also count most of the world's greatest economic powers (e.g., France, Germany, Great Britain, Japan) among its allies. America's defense industrial base is unsurpassed in its ability to combine technologies in complex combinations through its unparalleled expertise in systems integration and architecture integration (i.e., the building of networks).

These advantages enable the United States, should it so choose, to develop (and, in select cases, field) a relatively wide range of capabilities that can be combined in complex systems. This confronts an adversary with a wide array of existing and potential military "tools" that may be used against it in a military competition.[85]

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[85] Examples of investments in complexity are: combined arms ground operations comprising infantry, artillery and cavalry; the integrated air-land-radio operations that characterized *blitzkrieg;* the strategic nuclear triad of bombers, ICBMs, and SSBNs, and theater and tactical nuclear forces; air-land-sea-space joint operations; and, on the horizon, highly integrated battle networks.

For example, during the 1930s the US Navy was developing a relatively diverse set of means for destroying an enemy battle fleet. In the years immediately prior to its entry into World War II, improvements were being made in the Navy's battleships (e.g., new ships, larger caliber guns, radar-directed fires); submarines (torpedo attack); and, perhaps most importantly, strike aviation (dive bombing and torpedo attack).[86] Any competitor contemplating competing with the US fleet would have to stretch its resources to account for this diversity in striking power, and the variety of combinations in which it might be employed. For instance, developing defenses against torpedo bombers but not dive bombers or submarines would cause a US rival to incur high risk. Moreover, until the early 1940s the US fleet was comparatively small relative to the size it would quickly achieve during the war. Would-be adversaries could still not be certain as to how the United States would choose to scale up the size of its fleet if war came, or the mix of capabilities it would emphasize, as it had created a substantial number of options for itself.[87]

In short, by inducing risk and uncertainty through an investment strategy of complexity and diversity, the United States posed a problem for Japan, a greatly inferior industrial power, of whether to stretch its resources or to concentrate them. With the considerable advantage it enjoyed in scale, the United States was able to both choose the preferred forms of competition when the war began (i.e., submarine warfare and fast carrier task force operations vice battleships operating in a battle line), and to combine these forces in the most effective manner, and on a scale that the enemy could not match.[88]

Finally, time can play an important role. The adversary's uncertainty can be further increased if the life span of the military capabilities is relatively short, as is more often the case during periods of discontinuity in the military competition. This keeps the "product line" churning at a rapid rate, enabling greater diversity and increasing the adversary's level of risk. Under these circumstances, if an investment strategist

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[86] The Navy also explored placing its aerial strike assets on a wide variety of platforms, to include carriers of different types (four classes were built); surface combatants; and submarines. Furthermore, land-based strike aircraft and seaplanes were also developed—the former by the Army Air Corps, and the latter by the Navy.

[87] In 1940 the United States had less than ten aircraft carriers. Five years later it would have just short of 100. Meanwhile, battleship production, which had been at the core of the Navy's modernization efforts prior to the attack on Pearl Harbor, was terminated entirely by 1945.

[88] In the end, the Japanese leadership decided to take a risk and attack the United States. They did so under the assumption that before the range and scale of US capabilities could be brought to bear, Japan would have achieved their war objectives. Having done so, Tokyo hoped to presented the United States with the prospect of a long, costly war effort should it desire to reverse Japan's gains.

can also count upon a military establishment proficient in time-based competition, an adversary's problems are further compounded.[89]

"Black" Programs

Investment strategists can also induce uncertainty into an adversary's planning and investments, while increasing the chances of maximizing the effectiveness of their own investments, through the selective use of highly classified, so-called "black" programs. Black programs can be a powerful investment tool, particularly given that the United States has a strong track record of undertaking black programs highly effective in shaping the military competition and altering the military balance. Without a doubt, the most significant black program was the United States' Manhattan Project, which yielded atomic weapons. Other US black programs that have had a significant influence on adversaries are the U-2 and SR-71 ("Blackbird") spy planes and the F-117 stealth fighter.[90]

A well-established track record in black programs creates uncertainty in the minds of adversaries.

A well-established track record in black programs creates uncertainty in the minds of adversaries. In crafting their investment strategies, competitors of the United States must take these programs into account. If they fail to do so, adversaries run the risk that, once their investment strategies are locked in, the United States may reveal a black program (or programs) that undermine these strategies, thereby devaluing a

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[89] Evidence of this can be found in the corporate sector, where several firms have exploited time-based competition (or "time pacing") to advantage. For example, 3M Company for a time dictated that 30 percent of its revenue must come from new products every year. The Gillette Company for a time undertook roughly 20 product transitions per year—a steady flow of developing, launching and terminating products. Its goal in this endeavor is "not just reacting to competitors" but rather "orchestrating and commanding a business." See Eisenhardt and Brown, "Time Pacing: Competing in Markets that Won't Stand Still," pp. 178–79, 181.

[90] The U-2 was a high altitude reconnaissance plane developed in secret by the CIA, designed to conduct overflights of the USSR. Personnel and equipment were procured through the Air Force but that service had very little say in the early development. When the aircraft looked plausible, about a year later, the Air Force contracted through the CIA to produce Air Force versions, but even then the CIA had the majority share in development. Gregory W. Pedlow and Donald E. Welzenbach, *The CIA and the U-2 Program, 1954–1974* (Center for the Study of Intelligence: Central Intelligence Agency, 1998), Chapter 2. The stealth fighter program began in the Defense Advanced Research Projects Agency (DARPA) as a program for Experimental Survivable Testbed (XST), building on some reduced radar cross-section (RCS) features first explored on the SR-71. This program, know as Have Blue, would be the first aircraft designed from the ground up to be stealthy. The constraints this posed were enormous. Every piece of the plane had to be designed for stealth, from the engine intake and exhaust to the landing gear doors to the cockpit windows. It was a highly compartmented undertaking and security around the project was tight. Unlike many previous Lockheed Skunk Works endeavors that featured everyone on the project working in one room, very few people knew the full scope of the program. Even the engines for the first Have Blue aircraft were scavenged from a T-2B trainer aircraft, the landing gear from an F-5, and cockpit controls from an F-16 to hide their ultimate destination. The initial engine tests were conducted after dark, between two semi-trucks with netting stretched across them. David Donald, ed., *Black Jets: The Development and Operation of America's Most Secret Warplanes* (Norwalk, CT: AIRtime Publishing, 1994), pp. 67–75

competitor's investment. Perhaps even more discouraging from a competitor's point of view, the United States may decide to keep critical "antidote" capabilities in the black world rather than reveal them, even after the competitor displays his proscribed capabilities. The effect, especially when backed with a long track record of effective black program development, will likely heighten the risk and uncertainty felt by the United States' adversaries, thereby complicating their investment planning. The effect is even greater in periods of military discontinuity.

Given these considerations, Defense Department investment strategists are advised to weigh carefully whether a program should be developed in the black world. The timing of when to reveal a black program's existence should be made with strong consideration as to its potential disruptive effects on adversaries, as well as the immediate needs of US forces. There are cases where competitors sought, rather effectively in some instances, to employ "black" programs to good effect. Admiral Fisher used secrecy in developing the *Dreadnought,* his fast battle cruisers, and the Royal Navy's submarine force in attempting to create in the minds of his competitors risk and uncertainty regarding the true focus of Great Britain's naval building programs. The British Admiralty later attempted to maintain the secrecy surrounding the development of the ASDIC, a key capability for countering the threat from submarines.[91] Efforts to preserve secrecy also prevailed with respect to other "black" military capabilities, such as the United States' Norden bomb sight and proximity fusing of munitions.[92]

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Strategic Outsourcing

In every major war of the 20th century, the United States fought with allies at its side. Although costs are incurred when entering into an alliance, such as some loss of freedom of action, allies can augment US military capability substantially, and on short notice. There has, however, been an unambiguous trend of allies' declining value to

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[91] The forerunner of SONAR (SOund Navigation And Ranging), ASDIC searched for German submarines by sending sound waves out from under the ship, and listening for the return. The acronym stood for Anti-Submarine Detection Investigation Committee, which Winston Churchill claimed was a research body formed during World War I, but in fact did not exist. The acronym was coined by the British Admiralty to conceal the nature of the work, and the name was announced later. It has been speculated that ASDIC grew out of an Anti-Submarine Defense (ASD) program begun near the end of World War I, and that the "ic" was added to hide this fact. See http://home.iprimus.com.au/waldingr/hda.htm.

[92] The Norden Bombsight was a mechanical analog computer made up of gyros, motors, gears, mirrors, levers and a telescope. It was used to determine the exact moment a bomb had to be dropped to hit the target accurately. On later versions of the B-17, the bombsight would actually fly the plane through the bomb run. It was claimed to be accurate enough to hit a 100 foot circle from and altitude of 21,000 feet. In actual combat conditions its accuracy was usually less than that. During World War II, great precautions were taken to guard the secrecy of the Norden bombsight. Under armed guard, the sight was loaded onto its aircraft just before takeoff. It was covered from view until in the air. Upon landing, it was immediately removed, again under armed guard and secured. By the war's end, over 45,000 bombardiers had been trained in its operation, each of them swearing under oath to protect its secrecy. See http://www.airpowermuseum.org/trnorden.html; http://www.hill.af.mil/museum/photos/wwii/norden.htm; http://www.uh.edu/engines/epi1004.htm; and http://home.iprimus.com.au/waldingr/hda.htm.

the United States over the past century. Consider that in World War I, US forces represented only a fraction of those fielded by Britain and France on the Western Front in Europe. In World War II, the United States, along with Britain and the Soviet Union, constituted the "Big Three" of the allied coalition against Germany, Italy and Japan. During the Cold War, however, US forces clearly were dominant compared with those fielded by its allies. After the Cold War, in the two Gulf Wars and in other conflicts, such as the 1999 Balkan War, US military capabilities dwarfed those of its allies to the point where their value was seen principally as legitimizing America's use of force and freeing up US troops from peacekeeping chores.[93] The decline in the value of allies as a source of needed military capability is also reflected in US strategic planning and investment documents, such as the 1993 Bottom-Up Review, and the 1997 and 2001 Quadrennial Defense Reviews, which barely mention allies.

US investment strategy should be made with an eye toward ensuring that the United States remains the "ally of choice."

At present, many allies—particularly America's NATO allies—are reducing their defense investments to remarkably low levels, and it is not clear at what point they might reverse this trend, or what would motivate them to do so. Nevertheless, the United States' ability to influence ally investment strategies is quite limited. They may represent a declining asset during a period of discontinuous geopolitical change.

Generally speaking, US allies are, with some possible exceptions, no longer as durable or reliable as they were during the Cold War. Given the change in the form and, importantly, the location of major challenges to US security, it seems likely that the United States will also find its alliance portfolio shifting, perhaps dramatically, over the next decade or two. This presents clear challenges for US investment strategists who must not only deal with the prospect of a discontinuity in the character of the military competition, but also with respect to alliance structures as well.

How will this relatively high level of geopolitical uncertainty in the form of a shifting alliance portfolio influence US investment strategy? Once again, given the increased risks associated with relying on certain allies, and the uncertainties regarding changes in existing alliances and the formation of new alliance relationships, this is a difficult question to answer. What is clear is that the United States should attempt to shape ally investments in ways that are both useful to its security and non-threatening to US interests. As noted above, however, the absence of a clear set of operational challenges and associated concepts of operation is a major handicap in developing investment strategies for US capabilities, and consequently for determining desired allied capabilities as well.

Despite these problems, US investment strategy should be made with an eye toward ensuring that the United States remains the "ally of choice" for key allies, both existing and prospective. This involves having substantial insight as to what capabilities allies are likely to value most. Just as with deterrence of adversaries, reassurance

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[93] This is not to say that America's NATO allies lack the capacity to provide military forces on a large scale. For example, the European Union (EU), most of whose members are also members of NATO, boast a population and a GDP greater than that of the United States.

of allies rests in the eye of the beholder. Here US investments should be informed by both the Department's understanding of what allies will require during and following this discontinuity in the military competition, and by the allies' assessments of their own needs.

Department investment strategists should also look for ways to increase the cost to allies for pursuing independent paths that could weaken America's alliances. For example, US investment in a large nuclear strike capability has, along with its policy statements establishing a "nuclear umbrella" over key allies, dissuaded certain allies from pursuing this capability. If there are other emerging capability areas (e.g., space, precision warfare, global C4ISR) where the United States would benefit from having a monopoly or near-monopoly with respect to its allies, then the Department's investment strategy should be crafted with this objective in mind. If successful, this effort could ensure that allies remain dependent on the United States for critical capabilities.

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Assuming the Department can develop a clear vision of what discontinuities may occur and what their effect on US military requirements will be, Department investment strategists may be able to identify a new division of labor with America's allies that will enable the US to dominate key warfare areas. For example, it appears all but certain that the armor/anti-armor competitive balance that played a key role in Cold War era military balance assessments (and in alliance discussions over shared responsibilities) has become far less critical to the military balance,[94] while other considerations involving counterinsurgency, counter-terrorism, or information warfare, to name a few, have grown in importance. What would the Department most benefit from in terms of allied military capabilities in this new era? How might the Defense Department's investment strategies encourage this? These questions should be addressed in the process of crafting the Department's investment strategy.

Ideally, Department investments would enable allies to field capabilities where the United States does not have an enduring competitive advantage—or where a shortage exists owing to problems of scale. With respect to maritime forces, for example, allies may prove most helpful in the area of small, networked combatants. The US Navy plans to procure a substantial number of these craft. However, there are a range of missions (e.g., counterdrug; Proliferation Security Initiative; peacekeeping/enforcement; commerce protection against acts of piracy/terrorism;

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[94] Some might argue that the use of IEDs in Afghanistan and (especially) in Iraq and the corresponding US decision to procure thousands of MRAPs at a potential cost exceeding $20 billion indicates the armor/anti-armor is alive and well. To be sure, the issue of "force protection" is a high priority for manpower-challenged militaries like those of the United States and its principal allies. However, US counterinsurgency doctrine encourages troops to mingle among the population, and to maintain a persistent presence, not commute to and from isolated American bases in heavily armored vehicles. Moreover, a strong argument can be made that in both conventional and irregular warfare environments the competition has shifted decisively in favor of anti-armor forces. Adding more armor to existing vehicles increasingly seems a less attractive way to defend against anti-armor forces, relative to alternatives. For a critique of the MRAP decision see Andrew F. Krepinevich and Dakota Wood, *Of IEDs and MRAPs* (Washington, DC: CSBA, 2007).

homeland defense) for these types of ships that may overwhelm the fleet's ability to provide them (just as the Army is now severely taxed, rotating forces through a number of forward locations and conflicts). If this proves out, the Defense Department might look for ways to assist allies in developing their capabilities in this area, to better support US maritime forces.[95]

While Defense investment strategists identify ways to support allied development of certain military capabilities, they should also seek to *minimize,* to the extent possible, the transfer of key military capabilities or technologies, owing to the decline in ally durability and reliability.[96] The Department incurs two types of risk in transferring a military capability with a long life span. One is the risk of lock-in, mentioned above. Considerable resources may be invested, either by the United States or its ally (or both) in fielding a military capability whose value stands to decline precipitously, far in advance of its expected life span. The other is that, over time, the alliance relationship may fade, leaving the United States' erstwhile allies with key military capabilities that may be used in ways detrimental to US interests. One recalls, for example, the sale of advanced F-14 aircraft and Phoenix missiles to the Shah of Iran only a few years before he was deposed by an Islamic fundamentalist regime.

It may be possible to construct an alliance relationship that emphasizes allied access to *capabilities* based on proprietary US technologies on an "as-needed" basis. Such an approach might be workable, for example, with respect to the US global C4ISR architecture, which is projected to be a highly networked "system of systems." Might the United States allow allies to tap into the architecture on an "as needed" basis? Such architecture "loaners" (or perhaps "rentals") would be different from Cold War era US systems transfers (e.g., selling advanced fighter aircraft). Allies could 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.

The United States might also consider temporary transfers of certain systems to allies that could boost their military capability substantially—but briefly. For example,

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[95] One example of such an effort is ADM Michael Mullen's "Thousand Ship Navy." Also known as the Global Maritime Partnership, the idea has garnered support among senior Navy leaders who see it as a way for the service to continue to address the potential problems associated with guerrilla war at sea conducted by Islamic radicals. The goal is to enlist the participation of many nations whose relatively small fleets are not suitable for operations against a major maritime competitor (e.g., countries such as China), but which could be quite effective against Islamist radicals' efforts to employ mines, short-range antiship missiles, or suicide boats to attack commerce at key maritime chokepoints and in littoral waters. The concept was developed while ADM Mullen was Chief of Naval Operations. He is now Chairman of the US Joint Chiefs of Staff. Cited at http://www.military.com/forums/0,15240,125158,00.html, accessed on October 2, 2007.

[96] Of course, there are certain existing or *de facto* US allies, like Great Britain, Israel and Japan, for example, whose reliability and durability remain strong. But they are the exception. And even in the case of friendly states like Israel there are concerns over its willingness to share transferred technologies with other states that are not on good terms with the United States.

guided munitions might be one candidate for transfer. They would require relatively little training, yet could greatly increase the recipient's capabilities.[97] Another candidate for "as needed" support is the United States' high-fidelity training infrastructure. American training facilities could enable allied personnel to master relatively quickly US capabilities that were about to be transferred, or to which allied forces were going to be given temporary access. Allied forces might be permitted access to the Defense Department's national training centers, which have proven important in developing and sustaining the US military's competitive advantage in conducting highly integrated and complex operations.

As with any situation involving the provision of military support as opposed to a transfer of military capability, the United States will have to consider how to deal with those situations where an ally desires access to US capabilities to undertake military operations that are contrary to US interests. For example, the United States might confront a "Suez" situation in which it does not support its allies' objectives.[98] Withholding badly needed support at a critical moment could raise strong doubts about America's reliability as an ally.

Essentially, in pursuing this investment strategy, the United States would be offering its allies the potential to augment substantially their military force effectiveness very quickly, not by introducing American forces, but rather primarily by providing access to US force "enablers" (e.g., C4ISR architectures, the high-fidelity training infrastructure, advanced guided weapons).[99] Investments like this (e.g., investing in substantial excess capacity for guided munitions) provides a way for the United States to remain an attractive ally in terms of its competitive advantage in advanced military-unique technologies, but mitigates the problem of transferring advanced capabilities to allies whose long-term reliability and durability may be uncertain.

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This investment strategy implies a United States competency in time-based competition—the ability to augment with great speed the military capability of its allies without directly involving US forces. As long as these competitive advantages

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97 The British, for example, have long been the recipients of advanced US munitions, to include submarine-launched ballistic missiles and, more recently, Tomahawk land-attack cruise missiles (TLAMs). The United States also has transferred high-end munitions such as Stinger man-portable anti-aircraft missiles. These missiles proved extremely effective in the Afghan rebels' struggle with Soviet occupation forces in the 1980s, even though they were also quite sophisticated and the rebels were not "technically literate."

98 The reference here is to the 1956 Suez Crisis. During the crisis, United States opposition to the Anglo-French invasion of Egypt, combined with the Soviet Union's nuclear threats against Britain and France, contributed significantly to France's decision to distance itself from the NATO military command structure, and to pursue an independent nuclear capability. See Seymour M. Hersh, *The Samson Option* (New York: Random House, 1991), pp. 40–44; and McGeorge Bundy, *Danger and Survival* (New York: Vintage Press, 1988), pp. 474–75.

99 To a small degree, this has already occurred. For example, during the Falklands War and First Gulf War, Britain and certain Coalition members, respectively, were given access to US satellite data. In the period preceding the Second Gulf War, British and Australian special forces trained with their US counterparts at Nellis Air Force Base.

remain unique to its military, the United States could boost an ally's military capability dramatically much more quickly than any competitor could. This capability could make the United States an irresistible ally.[100]

The Global Basing Infrastructure

Infrastructure investments in the form of the global basing network are critical to the US military's overall effectiveness (e.g., deployment rates; positional advantage; reassurance of allies). These investments can be quite substantial. Moreover, the discontinuities in the geopolitical and military-technical competitive (or threat) environment outlined earlier in this paper require a rethinking of strategic investment patterns with respect to the US global basing posture. Specifically, investment priorities may need to be substantially reordered owing to the changing threat profile, declining ally durability and reliability, shifting locus of the principal military competitions from Europe to the Arc of Instability, and growing anti-access/area-denial capabilities of potential adversaries. A fourth factor may also prove important. It involves the potential need to place more emphasis on preventive/preemptive war, which may exacerbate access problems.

The risk and uncertainty associated with these trends argue for a hedging strategy when it comes to investing in the US global basing posture—an options-based approach that conforms to new geopolitical and military-technical realities, and potential opportunities. It bears repeating that decisions with respect to investment strategies associated with the global basing posture will be tightly linked to the Department's vision of what discontinuities in the competition it anticipates, and how it plans to address them in terms of future military operations and capabilities. These factors, together with the US military's investments in transforming its basing structure, could prove critical to the United States' ability to project power effectively, and at reasonable cost.

For example, investing substantial resources in large, main operating bases (MOBs) are likely to prove less attractive given the growing uncertainty over ally durability and reliability, and the uncertainty over when enemy A2/AD capabilities will be fielded in militarily significant numbers. Investing heavily in bases whose use may be withheld from US forces by an ally appears to court risk rather then reduce it. Similarly, placing major US military assets that may be increasingly vulnerable to a rival's A2/AD capabilities could court a 21st century "Pearl Harbor." Hardening these bases to withstand an attack from enemy missile forces may reduce the risk, perhaps considerably. However, this is an expensive proposition, and there is no guarantee

[100] Note that this investment strategy is not invalidated because of the likelihood that military-related technology will be more diffused.

that, once a base has been hardened, an ally will make it available for use.[101] Viewed in this light, the Defense Department's investment in other basing options appears to be prudent.[102]

[101] Christopher J. Bowie, *The Anti-Access Threat and Theater Air Bases* (Washington, DC: Center for Strategic & Budgetary Assessments, 2002), pp. 31–36, 54–56.

[102] See Andrew F. Krepinevich and Robert O. Work, *A New US Global Defense Posture for the Second Transoceanic Era* (Washington, DC: Center for Strategic & Budgetary Assessments, 2007).


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CONCLUSIONS

Recent and prospective discontinuous changes in the competitive environment require major shifts in the Defense Department's investment strategies. These strategies must be developed both in advance of future discontinuities (i.e., anticipatory transformation) in the military's competitive environment, and in its wake (i.e., reactive transformation). Currently the United States is struggling with both, even though senior Defense leaders clearly see the need to accord increased emphasis to security challenges which represent dramatic departures from the traditional competitions that dominated thinking and resource allocation during the Cold War and immediate post-Cold War periods. These discontinuities are associated with new forms of irregular warfare and the potential for catastrophic conflicts as well. There is also the potential for disruptive change—future discontinuities beyond those that confronted the US military in the immediate wake of 9/11 and the ongoing proliferation of nuclear weapons to unstable and potentially hostile states.

The challenge for US defense planners today is not choosing between winning today's war and preparing for tomorrow's challenges (or, to use Defense Secretary Gates' term, "next war-itis"). The Defense Department must adopt an investment strategy that takes future discontinuities into account. But it does so from a somewhat disadvantageous position. The ongoing war against radical Islamist terrorist organizations (i.e., the "Global War on Terrorism" or "Long War") and the related US military operations in Afghanistan and Iraq have heightened demands for defense investments that address immediate needs. The situation is further exacerbated by the military services' desire to emphasize an in-kind modernization effort to make up for the "procurement holiday" of the 1990s, and the greater-than-anticipated use rates for many types of existing military capital stock (e.g., Army helicopters; cargo aircraft; combat vehicles). While this is understandable to a degree, it also serves to limit the military's ability to hedge against an uncertain future. Consider that, as

the Second Lebanon War[103] between Israel and Hezbollah demonstrates, the Long War with radical Islamist elements may be characterized by discontinuities along the way, particularly if the enemy gains access to large numbers of guided weapons — the so-called G-RAMM (guided rockets, artillery, mortars and missiles) problem — or weapons of mass destruction, or advanced cyber weapons.

A key element of any investment strategy during a period of relatively high uncertainty (i.e., ongoing or anticipated discontinuity) is an increased emphasis on hedging. To the maximum extent possible, a hedging strategy should avoid locking in to either legacy or emerging capabilities. With respect to the latter, it is important to recognize the dangers of false starts and dead ends, and the value of wildcatting. To the extent that wildcatting enables field/fleet exercises at the operational level of war, it helps the Department buy options, or insurance, against an uncertain future, thereby reducing risk. Perhaps the ultimate expression of avoiding lock-in is to skip a generation of legacy systems as a means of avoiding in-kind replacement in a period of discontinuous change. Finally, the United States, with its enduring scale and technical advantages, can employ wildcatting to impose costs on its rivals by simply broadening its options portfolio, thereby complicating adversaries' planning by increasing their risk and uncertainty regarding what options the Department will ultimately exercise.

Emphasis must also be placed on time-based competition, which works to reduce risk and uncertainty while increasing the adversary's own investment planning challenges.

Emphasis must also be placed on time-based competition, which works to reduce risk and uncertainty while increasing the adversary's own investment planning challenges. The more effectively the Department can compete based on time, the lower the risk it need incur and, hence, the less of a need there is to hedge. Again, experimentation, particularly through field/fleet exercises, also provides a means for reducing risk and uncertainty, thereby enabling more effective use of limited investment resources. Unfortunately, for a variety of reasons, the Defense Department is not well positioned to compete based on time. Given the importance to its investment strategy — especially during periods of anticipated discontinuities in the military competition — high priority should be accorded to improving dramatically the Department's capability in this area. This implies a commitment to reforming the acquisition system, something no one has been able to accomplish for at least a generation.

The turbulent geopolitical situation and unfavorable trends in ally investment strategies argue for the Department to consider not only US military capability/capital stock, but also the potential continued decline in the value of ally capabilities in key areas. If history is any guide, however, shifting resources to address the discontinuities in the military competition that have emerged in the past few years will prove

[103] The Second Lebanon War occurred in July and August of 2006. During the conflict, the radical Islamist group Hezbollah fired some 3,970 rockets into Israel from southern Lebanon, and claims to have an arsenal of at least 33,000 rockets. Katyusha rockets were the main offensive weapons used by Hezbollah in the war, accounting for roughly 95 percent of the rockets employed. Hezbollah also employed at least three unmanned aerial vehicles (UAVs) in the war and at least two Iranian-made C-802 radar-guided anti-ship missiles. See http://en.wikipedia.org/wiki/Hezbollah_rocket_force. Accessed on May 18, 2008.

difficult. One need only examine the recent decision by Secretary of Defense Robert Gates to rush large numbers of mine resistant ambush protected (MRAP) armored vehicles to soldiers and marines in Iraq to see how immediate war needs can crowd out investment for other priorities.[104] Getting the Services to restructure their investment profiles to prepare for future discontinuities will be more difficult still. Indeed, in the final analysis, investment strategy techniques in periods of military discontinuity are only tools. If they are to be applied properly, the most senior leaders in the Defense Department, to include the Secretary of Defense, must have a clear sense of what types of challenges are most likely to stress the US military in its endeavors to preserve the nation's security. Beyond that, however, the leadership must devote substantial energy toward developing and overseeing a process by which decisions can be made as to what mix of investment strategies should be pursued. This requires a good understanding of current and prospective rivals (and of allies as well), and rigorous, focused and ongoing analysis to identify potential discontinuities and how they might be countered or exploited. Success here will enable senior decision-makers to make informed choices across traditional Service investment boundaries, increasing the "trade space" available to the Defense Secretary.

Finally, if the Defense Secretary is to convince the Services to abandon their natural instincts to resist the prospect of large-scale change, then he must be willing to make major investment decisions on far less than definitive information as to what constitutes the optimal force and investment mix for the US military. The inability or unwillingness of senior decision-makers to make these "hard choices" is, perhaps, the principal reason why the US military is *reacting* to the transformation in certain areas of warfare that clearly emerged in the wake of 9/11, rather than having anticipated it. Unless this problem is redressed, the Department will find itself continuing to react to — rather than anticipate — future discontinuities in the military competition. If this proves to be the case, the argument for adopting the investment strategy techniques outlined in this report becomes even stronger.

[104] This is not to say that Secretary Gates' priorities with regard to surging MRAP production are misplaced. Rather, it is a commentary on how immediate requirements often overwhelm longer term considerations.

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