



Full-Spectrum Air Power: Building the Air Force America Needs

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Executive Summary

Much of what is written today about the capabilities required by the military services is offered within the context of fiscal restraint, national budget austerity, and cuts in the defense budget to ensure that the armed services pay their “fair” share of deficit reduction. This study argues for building an Air Force to support a joint force that can meet current and future threats to American security without regard for arbitrary fiscal guidelines and ceilings. It is time for the United States to adopt an asymmetric strategy linking objectives and resources, emphasizing the role of air power, and maximizing U.S. Air Force contributions to that strategy.

How Did the Air Force Arrive in This State? A number of factors have led the U.S. Air Force into its current state—described by some as “geriatric.” The size of the Air Force has declined in tandem with the perceived threat and as a result of a decade-long concentration on land combat against irregular forces. Without new aircraft to replace the existing fleet, the Air Force was required to keep its aging aircraft

flying, creating a “death spiral”—spending funds on maintenance, repair, and overhaul of obsolescent airframes instead of acquiring new aircraft. Moreover, the Air Force has engaged in nearly continuous combat operations since Saddam Hussein’s forces crossed the Kuwaiti border in 1990. The “long hard slog” of counterinsurgency that occupied America’s armed forces over the past decade emphasized a manpower-intensive doctrine that sought to find and fix an elusive, asymmetric adversary in unconventional armed conflict at the expense of the core Air Force missions of air superiority and long-range strike.

The Principal Security Challenges Facing the U.S.

Military and the Air Force. The principal military challenges driving the need for improvements in the Air Force are: *detering* hostile actions by an increasingly confrontational China and overcoming the anti-access/area denial (A2/AD) military capabilities being fielded by that country; *preventing* the aggression of regional rogue states, such as North Korea and Iran, whose militaries

could be armed with nuclear weapons; and *prevailing* against the varied brands of violent Islamist radicalism that threaten terrorist acts against important U.S. interests and allies.

Building a Full-Spectrum Air Force. This study argues for building an Air Force to support a force capable of meeting current and future threats to American security without regard for arbitrary fiscal guidelines and ceilings.

Detering China. To overcome China’s increasing A2/AD capabilities, and to deter China from regional aggression, this report makes a number of specific recommendations:

Build the new long-range bomber,

Reopen the F-22 line,

Acquire an advanced version of the Navy’s unmanned combat air vehicle (UCAV),

Fortify space and cyberspace, and

Develop and field a new intercontinental ballistic missile (ICBM).

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Preventing Regional Aggression.

To prevent regional aggression and to stem nuclear proliferation, this paper recommends that the Air Force:

- Continue the F-35 program as planned,
- Strengthen the intelligence, surveillance, and reconnaissance (ISR) decision chain,
- Acquire and field the new airborne tanker,

- Research and develop missile defenses for regional air bases, and
- Develop and field a hypersonic munition.

Prevailing Against Radical Islamist Terrorism. As the U.S. de-emphasizes its large ground presence and seeks to substitute technology for manpower in counterterrorist operations, the Air Force needs to:

- Focus layered ISR on counterterrorism operations,
- Increase targeting capacity for irregular warfare,
- Add airborne capacity and capability to enable counterterrorism operations, and
- Recommit to the Total Force.

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Abstract: A combination of procurement holidays, high operational tempo, and a de-emphasis of strategic conventional bombing have left behind an Air Force that is inadequately prepared to meet the range of challenges to America's security. In contrast to the latest versions of budget-driven defense policy, this study argues for building an Air Force to support a joint force that can meet current and future threats to American security without regard for arbitrary fiscal guidelines and ceilings. The United States cannot successfully underwrite its foreign and defense policy objectives without increased investment in Air Force capacities and capabilities.

Much of what is written today about the capabilities required by the military services is offered within the context of fiscal restraint, national budget austerity, and cuts in the defense budget to ensure that the armed services pay their “fair” share of deficit reduction. The 10-year, \$487 billion reduction dictated by the Budget Control Act of 2011 and the current debate over further cuts from “sequestration” are only the latest versions of a budget-driven defense policy. Yet the United States Air Force is already operating the oldest fleet in its history in a security environment that the Chairman of the Joint Chiefs of Staff has characterized as unprecedented in the range of threats that challenge America's security. The facts are disturbing:

- The average age of the air fleet is older than at any time in Air Force history—dating back to the Army Air Corps of World War II.
- Aircraft in the inventory are accumulating far more flight hours than originally planned, with attendant increased time in depots for repair and reconstruction.
- The total number of Air Force fighters has fallen by nearly 25 percent since 2001. The Air Force has 372 fewer F-16s, 263 fewer F-15s, and 52 fewer F-117s than were in the inventory in 2001.
- The Air Force has no modern long-range bombers. The 21 B-2s, its newest bombers, are now 20 years old.
- The Air Force budget has dropped from 21 percent of total federal expenditures in 1960 to 4.7 percent in 2000.
- The Air Force procured more aircraft in the 1950s than during the next five decades (1960 to 2010).
- The KC-135, the principal Air Force tanker, was built in the late 1950s and early 1960s and will not retire from service until 2040.
- The Minuteman intercontinental ballistic missile (ICBM), on alert today at the heart of the strategic triad of nuclear forces, was first deployed in the early 1970s.
- The B-52, the Air Force's most numerous bomber, was produced in the late 1950s and early 1960s.

- The service lives of modern fighters now extend beyond 30 years.
- Since 9/11, the Air Force share of the Department of Defense budget—about 20 percent—has dropped to a historic low.
- Over the next five years the Air Force will eliminate six combat-coded fighter squadrons and one non-combat-coded fighter squadron, including A-10s, F-15s, and F-16s.
- In that drawdown, the Air Force will shrink by 303 aircraft: 123 combat aircraft; 150 mobility and tanker aircraft; 30 intelligence, surveillance, and reconnaissance (ISR) aircraft; and 18 remotely piloted aircraft.
- Under current aircraft acquisition plans, the recapitalization rate—the time required to replace the force given the planned number of aircraft procured—is roughly 100 years.
- The Air Force employs the lowest number of personnel since its inception.

This study not only examines the current state of the U.S. Air Force, but recommends where to invest to allow a reinvigorated Air Force to meet the security challenges facing the United States. Chapter 1 describes the current state of the Air Force and explains several of the factors that led to its obsolescent state. Force planning for the air arm has never been a precise science, and the gradual move away from a strategic concept advocating a “two-war” threat-based capability coupled with a recent focus on combating irregular opponents has clouded the issue of “how much airpower is enough.” Chapter 2 examines the current security environment and finds plenty for the Air Force to do. However, today’s Air Force is not equipped to do it. New directions for U.S. military strategy, the “pivot” to the Western Pacific, and concern about the “anti-access/area denial” (A2/AD) and power projection intentions of would-be adversaries provide a new foundation for Air Force planning and a blueprint for investment. In light of that threat, Chapter 3 examines major plans, programs, and initiatives in Air Force planning and evaluates them in terms

of their value added to deterrence and defense in the emerging security environment. It makes the case for those Air Force capabilities and capacities required to support the joint force, underwriting U.S. foreign and defense policy objectives across the spectrum of conflict in the near term and midterm.

This study argues for building an Air Force to support a force capable of meeting current and future threats to American security without regard for arbitrary fiscal guidelines and ceilings. Students of American foreign and defense policy during the Cold War will recall John Lewis Gaddis’s *Strategies of Containment* in which he contrasted the strategies developed over those years to match objectives and budgets based on perceptions of resources available.¹ In the current climate of fiscal austerity, it may again be time to adopt an asymmetric strategy linking objectives to budgets by emphasizing the role of air power² and maximizing Air Force contributions to that strategy.

1. John Lewis Gaddis, *Strategies of Containment* (New York: Oxford University Press, 1982). Gaddis differentiated between “symmetric” strategies buoyed by expanding resources and “asymmetric” strategies adopted in times of budgetary constraints.

2. My colleague Ben Lambeth reminds me that air power—actually air and space power—is a complex amalgam of hardware and less tangible ingredients that bear on its effectiveness, such as employment doctrine, concepts of operations, training, tactics, proficiency, leadership, adaptability, and practical experience. Air power is functionally also inseparable from battlespace information. Air power, properly understood, is a joint service undertaking. The purpose of this paper is not to explore all of these components of air power, but to focus on building an Air Force to meet the three principal challenges to U.S. security. See Benjamin S. Lambeth, “The Role of Air Power Going into the 21st Century,” in *Emerging Threats, Force Structures, and the Role of Air Power in Korea* (Santa Monica, CA: RAND Corporation, 2000), http://www.rand.org/pubs/conf_proceedings/CF152/CF152.chap6.pdf (accessed August 16, 2012).

Chapter 1

How Did the Air Force Arrive in This State?

How much air power is enough? Air power force sizing constructs are not known for their analytical rigor. During the Cold War and for some time afterward, Air Force tactical fighter wings were sized to support Army divisions, with a rough metric of one to two wings—composed of air superiority, interdiction, and close air support fighter aircraft—for each land division. Yet even with this metric and a force planning focus on Central Europe during the Cold War, the growing technological sophistication and attendant costs of developing and producing advanced fighter aircraft threatened the ability to field a force in the numbers required. A 1974 Brookings study on U.S. tactical air concluded that “the tactical air forces are receiving fewer aircraft and modernizing more slowly than at any time since the emphasis on US conventional capabilities was renewed at the beginning of the 1960s.”³

That turn to conventional deterrence was prompted by a national military strategy of “Flexible Response,” which departed from the nuclear-intensive “New Look” of the Eisenhower Administration. However, the need for additional conventional firepower was realized late in fighter aircraft—the Air Force acquired the Navy’s F-4 to obtain a conventional attack aircraft in Vietnam—and never was extended to the bomber force. Despite the extensive use of B-52s in conventional roles during the Vietnam War,

the robust fleet of B-52s required by General Curtis LeMay’s doctrine of “massive retaliation” remained dedicated to strategic nuclear deterrence. Without an emphasis on long-range conventional strike, the bomber force was allowed to atrophy as a marginal contributor to the nuclear triad composed increasingly by intercontinental ballistic missiles.⁴ New bomber programs were also seen through the prism of nuclear strike and arms control negotiations. President Jimmy Carter cancelled the B-1 in a time of perceived detente with the Soviet Union, and Ronald Reagan restored it as part of a campaign pledge to boost the nation’s nuclear arsenal. The proposed force of 100 B-1s and 132 B-2s was justified by calculations of damage expectancy and intended to replace the B-52 fleet. However, the B-2, despite its inherent conventional capabilities, was also a victim of conflating “strategic” with “nuclear.” As the Cold War ended and budgets declined, the stealth bomber was seen as a throwback to the nuclear competition with the Soviet Union, rather than a means of conducting long-range precision-strike conventional operations within contested airspace. Ultimately, the U.S. acquired only 21 of the planned 132 B-2s.

The major post-Cold War force planning exercises, documents, and declaratory U.S. defense policies provided little assistance in sizing the Air Force for the future and in clarifying a long-range vision of

needed capacities and capabilities. The “Base Force” developed by the George H. W. Bush Administration was essentially a straight-line reduction of military forces and budgets designed to hedge against a more dramatic and disjointed decrease spurred by calls for a “peace dividend.” Despite air power’s shining hour in Operation Desert Storm, during which the game-changing technologies of stealth and precision were first revealed on the battlefield, the subsequent “Bottom-Up Review” returned to methodologies of the past by sizing air power in relation to “boots on the ground” in force-on-force contingencies, and it cut fighter and bomber force structure significantly. Additional studies under the Clinton Administration—notably the “Report of the Commission on Roles and Missions of the Armed Forces,” the “Heavy Bomber Force Study,” and the “Deep Attack Weapons Mix Study”—made little attempt to alter the force planning models of the past or to stress the importance of conventional long-range air power as a unique American advantage and a requirement for effective joint operations.

The Quadrennial Defense Review (QDR), mandated by Congress to follow up the Bottom-Up Review process and augment the annual Secretary of Defense reports, continued as a series of conservative documents drawing down U.S. Cold War force structure while adjusting to emerging threats. Across these

3. William D. White, *U.S. Tactical Air Power: Missions, Forces and Costs* (Washington, DC: Brookings, 1974), p. vii.

4. Project Air Force at RAND advised otherwise. See Stephen T. Hosmer and Glenn A. Kent, “The Military and Political Potential of Conventionally Armed Heavy Bombers,” RAND Corporation, August 1987, <http://www.rand.org/pubs/reports/2009/R3508.pdf> (accessed August 23, 2012).

reviews, the “two major theater wars” approach used to generate the number of divisions, aircraft carriers, and tactical fighter wings remained remarkably constant, despite some rephrasing to match political pledges.⁵ Although the 2001 QDR hinted that the Department of Defense (DOD) would adopt a framework for transforming the U.S. military to meet a changed security environment and usher in a revolution in military affairs, such ambitions were set aside after 9/11 and the ensuing all-encompassing ground and counterinsurgency operations in Iraq and Afghanistan. The February 2010 QDR continued the tradition of basing force planning on two, nearly simultaneous large-scale conventional contingencies, while insisting that the joint force also be available to support contingencies beyond those two canonical scenarios. Thus, the most recent QDR provides no strategic rationale or guidance for reducing combat aircraft inventories. Indeed one could surmise that requirements have increased. But the trend is in the other direction.

Two recent declarations of policy by the U.S. Department of Defense and the Joint Staff stress the need to increase the priority of air power.⁶ “Sustaining U.S. Global Leadership: Priorities for 21st Century Defense,” released by the Department of Defense in January 2012, explicitly shifts the focus from

the ground-intensive strategies of counterinsurgency that have dominated military doctrine and budgets for the past decade to a “rebalancing” toward the Asia-Pacific region. The ability of U.S. military forces to project power into contested environments despite anti-access/area denial challenges is central to this newly declared strategy. A “Joint Operational Access Concept,” issued at the same time, further delineated that task. It identifies 30 operational capabilities that the future joint force will need to operate in highly contested environments against sophisticated adversaries. Many of those capabilities rely heavily on air power. Regrettably, the Air Force of today is not equipped to provide that air power, nor do these operational concepts offer concrete plans on how to build the necessary force.

The State of the Air Force Today

A number of factors have led the U.S. Air Force to its current state—which some describe as “geriatric.”⁷ Over time, the size of the Air Force has declined in tandem with the perceived threat and a recent concentration on land combat against irregular forces. From its numerical peaks during the early days of the Cold War and then in Vietnam, its total number of aircraft declined precipitously with the drawdown in Southeast Asia and the collapse of the Soviet empire.

As Air Force capacity shrank under strategic and fiscal guidance, the Air Force shifted to a quality-over-quantity emphasis—fewer aircraft capable of doing more things—starting with the F-4 series of fighter aircraft and continuing with current “fourth-generation” fighters, such as the F-15 and F-16.⁸

This approach worked for a while as the Air Force, in partnership with the defense industry, continued to modify these aircraft with increasingly sophisticated sensors and precision weapons. An F-16 rolling off the production line today (for a foreign customer)—termed by some as the “4.5 generation”—is far more capable than an F-16 built in the 1980s. Nevertheless, no matter how improved a single airplane might be, numbers matter when U.S. security objectives require deployments in distant theaters and frequent rotations. During the “procurement holiday” after the Cold War, aircraft production dropped dramatically. Without new aircraft to replace the existing fleet, the Air Force was required to keep its aging fleet flying, creating a “death spiral”—spending funds to repair and overhaul increasingly tired aircraft instead of acquiring new aircraft. Analysts and Air Force planners recognized this downward trend more than a decade ago. A RAND briefing in 2002 noted that while undercapitalization during the procurement holiday of the

-
5. The Bottom-Up Review advocated a force structure using a “building block” approach based on the Gulf War including four to five divisions and 10 Air Force fighter wings. This approach was continued through the 1997 QDR and the 2001 QDR. See Robert P. Haffa Jr., “Planning U.S. Forces to Fight Two Wars: Right Number, Wrong Forces,” *Strategic Review* (Winter 1999), pp. 15–21.
 6. U.S. Department of Defense, “Sustaining U.S. Global Leadership: Priorities for 21st Century Defense,” January 2012, p. 5, http://www.defense.gov/news/Defense_Strategic_Guidance.pdf (accessed August 14, 2012), and U.S. Department of Defense, “Joint Operational Access Concept (JOAC),” January 17, 2012, http://www.defense.gov/pubs/pdfs/JOAC_Jan%202012_Signed.pdf (accessed August 14, 2012).
 7. Rowan Scarborough, “Fleets Fade Away with Pentagon Budget Cuts,” *The Washington Times*, February 6, 2012, p. 1, <http://www.washingtontimes.com/news/2012/feb/5/fleets-fade-away-with-pentagon-budget-cuts/> (accessed August 14, 2012).
 8. See James C. Ruehrmund Jr. and Christopher J. Bowie, “Arsenal of Airpower,” *Air Force Magazine*, February 2011, pp. 77–81, <http://www.airforce-magazine.com/MagazineArchive/Pages/2011/February%202011/0211arsenal.aspx> (accessed August 14, 2012).

1990s could be tolerated briefly, given that the drawdown of the force could simply be seen as early retirement for some force elements, the procurement curve needed to start up soon or major force posture shortfalls would arrive after 2010.⁹

If the U.S. had entered a “strategic pause” at the end of the Cold War, allowing it to “skip a generation” of aircraft acquisition, the Air Force might have found the time and budget to nurture its legacy aircraft while investing in the research and development of a new fleet of aircraft that could have gradually replaced their less-advanced ancestors. Instead, “the Air Force has been engaged in nearly continuous combat operations since Saddam Hussein’s forces crossed the Kuwaiti border in 1990.”¹⁰ Shortly after the high-intensity campaigns of Desert Shield and Desert Storm, the Air Force enforced the no-fly zones over northern and southern Iraq, a decade-long air operation at a high operational tempo that only increased with the U.S. invasion of Iraq in 2003. Meanwhile, U.S. air forces were tasked with taking down the Taliban regime in Afghanistan and continuing air patrols over American cities after the 9/11 attacks on New York and the Pentagon. Aircraft were flying more than twice or three times as much as planned, aging the fleet prematurely.

The “global war on terrorism” also took its toll on Air Force

planning, force structure, and modernization. Air Force long-range, precision-strike capabilities made notable contributions in the first days of the Iraq and Afghanistan air campaigns. However, the “long hard slog” of counterinsurgency over the past decade de-emphasized the core Air Force missions of air superiority and long-range strike at the expense of a manpower-intensive doctrine that sought to “find and fix” an elusive, asymmetric adversary in unconventional armed conflict. The Air Force adapted to these tactics, and its improvements in joint command and control (C2) and ISR capable of tracking individuals, using unmanned air vehicles with precise targeting, and rapid response to calls for close air support, were noteworthy in defeating irregular combatants in remote and urban areas. However, this strategic focus on irregular conflict in relatively uncontested airspace prevented the Air Force from making well-received arguments to modernize its force to face a more sophisticated future adversary. A case of “next-war-itis” could appear as not fully supporting the war on terrorism—the task at hand. Thus, for many airmen who have experienced the Air Force support of ground forces as the primary mission over the past decade, the missions of air superiority and long-range strike that created the service’s birthright are notions found in his- tory books and old newsreels.

In addition, the Air Force has not championed a strategic vision that could have illuminated Air Force roles, missions, and core competencies in a brighter light. Continuing the AirLand Battle focus of the Cold War years, Tactical Air Command—the Air Force’s largest and most influential conventional air command—entered the 1990s with a vision of conventional war focused on supporting the Army with short-range air superiority and land-attack fighter aircraft.¹¹ This institutional momentum continued despite guidance from the top echelons of the Air Force and critiques from informed observers. In 1990, the Air Force released “Global Reach Global Power,” a white paper anticipating that the Air Force’s unique characteristics of speed, range, flexibility, and precision would serve as major contributors in meeting U.S. security objectives in a “new world order.”¹² As the Air Force embarked upon a major long-range planning effort in the mid-1990s, analysts outside the organization advised it to consider what the Air Force of the future might be asked to do and to emphasize its core competencies of long-range precision strike, stealth, air superiority, and global reconnaissance and surveillance.¹³

Despite these observations, the Air Force as an institution remained largely resistant to change. Some have attributed this organizational bias to its leadership—general

9. Kevin N. Lewis, “Force Modernization and Recapitalization: A Few Lessons Suggested by History,” RAND, July 2002.

10. Thomas P. Ehrhard, “An Air Force Strategy for the Long Haul,” Center for Strategic and Budgetary Assessments, September 17, 2009, p. 17, <http://www.csbaonline.org/publications/2009/09/an-air-force-strategy-for-the-long-haul/> (accessed August 14, 2012).

11. David A. Deptula, *Firing for Effect: Change in the Nature of Warfare* (Washington, DC: Aerospace Education Foundation, 1995), p. 13.

12. U.S. Department of the Air Force, “The Air Force and National Security: Global Reach, Global Power,” June 1990, http://www.afa.org/edop/2012/GRGP_Rice_1990.pdf (accessed August 15, 2012).

13. See Andrew Krepinevich, *The Air Force of 2016* (Washington, DC: Center for Strategic and Budgetary Assessments, 1996), and Robert P. Haffa Jr., “Wake-Up Call: What the Air Force Study on Long-Range Planning Should Conclude,” *Armed Forces Journal*, September 1996, pp. 54–58.

officers with predominantly fighter backgrounds from 1982 until 2008.¹⁴ At the end of that period the Air Force fielded roughly 1,475 operational fighter aircraft and bombers, but only 6 percent were long-range bombers, and a majority of those were committed to nuclear operations. Similarly, only 6 percent of the combat air fleet was considered stealthy—designed with low-observability radar cross sections enabling them to penetrate sophisticated integrated enemy air defenses.¹⁵ For all of its talk, the Air Force was not walking the walk of the military-technical revolution.

Other issues also led to a “crisis in institutional confidence,”¹⁶ contributing to the loss of Air Force influence in the bureaucratic politics that

shape the nation’s force structure and budgets:

- The loss of service acquisition authority because of the scandal involving the attempted lease of new tanker aircraft.
- The nature of joint combat in the Southwest Asia theater of operations in which Army officers assumed central responsibility—including the apportionment of air power—and consequently were promoted to the regional warfighting joint commands at the expense of qualified Air Force leaders.
- The Air Force’s singular focus on the F-22 program, which seemed

distant from the decade-long joint counterinsurgency mission and out of touch with the Pentagon’s priorities.¹⁷

Thus, there is plenty of blame to go around for the state of the Air Force today. It is more important to note the one overriding result of these trends: Today’s Air Force is ill-equipped to carry out the roles and missions assigned to it in the new national military strategy. However, the decline of the U.S. Air Force is a choice, not a fate. Understanding this reality requires outlining the major current and emerging threats to U.S. national security and specifying how the Air Force can be shaped to meet them.

14. See Mike Worden, *Rise of the Fighter Generals: The Problem of Air Force Leadership* (Maxwell Air Force Base, AL: Air University Press, 1998), http://ebooks.gutenberg.us/AU_Press_Collection/Books/Worden/Worden.pdf (accessed August 15, 2012).

15. Ehrhard, “An Air Force Strategy for the Long Haul,” p. 15.

16. *Ibid.*, p. 27.

17. *Ibid.*, pp. 28–29. Most recently, the Senate Armed Services Committee’s markup of the Pentagon’s fiscal year 2013 budget request precludes the Air Force from divesting, retiring, or transferring aircraft assigned to the Air National Guard and Air Force Reserve during next fiscal year. The committee went against the Air Force leadership’s recommended changes because it “was unhappy with the lack of analysis and justification” that caused these planned reductions to “fall more heavily on the Air National Guard,” and pushed for a commission to study the “appropriate makeup” of the total force.

Chapter 2

The Principal Security Challenges Facing the U.S. Military and the Air Force

Chairman of the Joint Chiefs of Staff General Martin E. Dempsey stated recently that the world is more dangerous than at any other time in human history: “More people have the ability to harm us or deny the ability to act than in any time in my life.” The chairman elaborated by pointing to the proliferation of precision weapons—destructive technologies that are now available to a “wider and more disparate pool of adversaries.”¹⁸ There is a fairly wide consensus regarding the scope and seriousness of these threats, but the implications for Air Force capacities and capabilities are not always transparent. This chapter outlines the most salient security challenges with the purpose of recommending an agenda for building the Air Force that America needs.

China and Anti-Access/Area Denial

Leading the list, China’s military buildup and advanced technological developments threaten America’s ability to project military power into the Western Pacific region and, thereby, to protect its interests and allies in this vital region. There is great uncertainty that China will

be as successful in the future as it has been the past 25 years—a period marked by military modernization and doctrinal reform. We cannot predict with confidence China’s future because the Chinese themselves are unable to do so. However, China’s capabilities, if not its course of action, are clear and inform U.S. strategy and force planning. China is fielding modern capabilities and devising new concepts to deny U.S. military operations in the Western Pacific. These anti-access/area denial capabilities are designed to prevent the U.S. from operating in the region as planned, specifically from forward land bases within relatively short range of the Taiwan Strait, the presumed nexus of conflict. To deny these bases to the U.S. and to threaten sea basing as well, the Chinese are investing in precision-guided surface-to-surface and anti-ship ballistic missiles, highly accurate land-attack and anti-ship cruise missiles, kinetic and directed-energy anti-satellite weapons, electronic and cyber-attack systems, ground and sea-based defenses of their critical infrastructure, and fourth-generation and possibly fifth-generation fighter aircraft.¹⁹ The 2011

DOD report to Congress on the rising military might of China’s People’s Liberation Army (PLA) has a number of implications for the U.S. Air Force.²⁰

- The January 2011 flight test of a prototype of the J-20, China’s next-generation fighter, highlights China’s ambition to produce a fighter aircraft that incorporates stealth attributes, advanced avionics, and supercruise-capable engines over the next several years.
- China is upgrading its fleet of B-6 bombers—originally adapted from the Soviet Tu-16—with a new, longer-range variant that will be armed with a new long-range cruise missile.
- The PLA Air Force has continued expanding its inventory of long-range, advanced surface-to-air missile (SAM) systems and now has one of the largest such forces in the world. Over the past five years, China has acquired multiple SA-20 PMU2 battalions, the most advanced SAM system that Russia exports.

18. Karen Parrish, “Dempsey: Nation Faces Security Paradox,” U.S. Department of Defense, <http://www.defense.gov/news/newsarticle.aspx?id=67921> (accessed August 15, 2012).

19. The Joint Operational Access Concept uses “anti-access” to refer to long-range capabilities designed to prevent a military force from entering an operational area. “Area denial” refers to shorter-range forces fielded to limit the opposing forces’ freedom of action within the area. For an earlier overview of the concept, see Andrew Krepinevich, Barry Watts, and Robert Work, *Meeting the Anti-Access and Area Denial Challenge*, Center for Strategic and Budgetary Assessments, 2003, <http://www.csbaonline.org/wp-content/uploads/2011/03/2003.05.20-Anti-Access-Area-Denial-A2-AD.pdf> (accessed August 15, 2012). For insight on anti-access and China’s military improvements, see Roger Cliff et al., *Entering the Dragon’s Lair: Chinese Anti-Access Strategies and Their Implications for the United States* (RAND Corporation, 2007), <http://www.rand.org/pubs/monographs/MG524.html> (accessed August 15, 2012).

20. U.S. Department of Defense, Office of the Secretary of Defense, “Military and Security Developments Involving the People’s Republic of China 2011,” http://www.defense.gov/pubs/pdfs/2011_cmpr_final.pdf (accessed August 15, 2012). See also U.S. Department of Defense, Office of the Secretary of Defense, “Military and Security Developments Involving the People’s Republic of China 2012,” May 2012, http://www.defense.gov/pubs/pdfs/2012_CMPR_Final.pdf (accessed August 15, 2012), and John H. Cushman Jr., “Pentagon Study Says China Military Getting Stronger,” *The New York Times*, May 18, 2012, <http://www.nytimes.com/2012/05/19/world/asia/pentagon-study-says-china-military-getting-stronger.html/> (accessed August 15, 2012).

- China's aviation industry is developing several types of airborne early warning and control system (AWACS) aircraft. These include the KJ-200, based on the Y-8 airframe, for AWACS as well as intelligence collection and maritime surveillance and the KJ-2000, based on a modified Russian IL-76 airframe.
- The PLA is acquiring a range of technologies to improve China's space and counter-space capabilities. A PLA analysis of U.S. and coalition military operations reinforced the importance of operations in space to enable "informatized" warfare, claiming that space is the commanding point for the information battlefield.
- PLA writings emphasize the necessity of destroying, damaging, and interfering with the enemy's reconnaissance and communications satellites, suggesting that such systems, as well as navigation and early warning satellites, could be among the initial targets of attack to blind and deafen the enemy.
- PLA military writings describe the use of electronic warfare, computer network operations, and kinetic strikes to disrupt battlefield information systems that support an adversary's warfighting and power projection capabilities. PLA writings identify integrated network electronic warfare as one of the basic forms of integrated joint operations, suggesting the centrality of seizing and

dominating the electromagnetic spectrum.

- China is developing measures to deter or counter third-party intervention, including U.S. military action in the region. Although many of these capabilities were developed with a focus on Taiwan, they have broad applications and implications extending beyond a Taiwan scenario. China's approach is manifested by its sustained effort to develop the capability to attack, at long ranges, military forces that might deploy or operate within the Western Pacific.

In sum, despite considerable uncertainty, China could emerge over the next decade as a major threat to U.S. security. With increasing anti-access and power projection capability, China's military could provide the means through which the PLA could seek to replace the United States as the principal military power in the Western Pacific and move toward hegemonic political and economic status in the region. As diplomatic and economic competitions unfold, the mission of the U.S. Department of Defense must be to maintain a favorable military balance of power in the region to dissuade China from making any aggressive or coercive moves against U.S. and allied interests in the region.

Iran and North Korea: Proliferation of Precision Strike and Nuclear Weapons

Iran and North Korea also pose significant risks to American

interests and international security because both countries have proceeded with ballistic missile and nuclear weapons programs despite international sanctions. Even if sanctions successfully slow their nuclear programs, short-range conventional precision weapons—often referred to as guided rockets, artillery, mortars, and missiles (G-RAMM)—could enable their military forces to mount precision attacks against American air bases overseas, making doubly difficult the deployment of short-range air forces into the theater of operations. Finally, the U.S. government has identified both states as sponsors of terrorism, and they are prime candidates to export primitive nuclear devices and precision conventional weaponry to non-state entities and proxies, such as Hezbollah and al-Qaeda.

The proliferation of advanced military technologies may allow Iran to develop its own A2/AD capabilities—like China, but on a smaller scale with Iran's capabilities tailored to the unique geographic characteristics of the Persian Gulf. A recent study of Iran's growing A2/AD capability argued, "Iran's acquisition of weapons which it could use to deny access to the Gulf, control the flow of oil and gas from the region, and conduct acts of aggression or coercion are of grave concern to the United States and its security partners."²¹ The study pointed to Iran's growing A2/AD capabilities in four broad categories: ballistic missiles, possibly armed with weapons of mass destruction (WMDs); G-RAMM holding at risk U.S. and allied forces deployed to bases and ports in

21. Mark Gunzinger, "Outside-In: Operating from Range to Defeat Iran's Anti-Access and Area-Denial Threats," Center for Strategic and Budgetary Assessments, 2011, p. ix, http://www.csbaonline.org/wp-content/uploads/2012/01/CSBA_SWA_FNL-WEB.pdf (accessed August 15, 2012).

the region; weapons and systems designed to close or control the Strait of Hormuz, including fast-attack aircraft, mine-laying platforms, and anti-ship cruise missiles; and air defenses.²²

- Iran has invested heavily in ballistic missiles as the primary means of launching conventional (with aspirations for nuclear, chemical, or biological) attacks at long ranges. In the near term, Iran's missiles lack the accuracy for effective attacks against U.S. and allied bases and ports in the region or against the oil infrastructure in the neighboring Gulf states. Therefore, these weapons would be used to threaten mass attacks against population centers to coerce regional states to deny access to U.S. forces.
- Precision conventional weaponry is proliferating from a variety of sources. Armed with G-RAMM using commercially available imagery and geo-location, Iran and its proxies could effectively use guided weapons against fixed facilities, such as fuel depots, ports, and airfields.
- The dominant scenario in a clash with Iran is the closure of the Strait of Hormuz, coupled with the declaration of a maritime "exclusion zone" that would deny access to U.S. and allied forces attempting to secure the maritime commons. To carry out this threat, Iran has acquired large

numbers of fast-attack surface ships, land-based anti-ship cruise missiles, modern mines, diesel submarines, and unmanned aerial vehicles (UAVs) that might be used in swarming, kamikaze-like attacks.

- Iran displays a sophisticated air defense system, although it has not yet acquired Russia's most potent SAM system, nor integrated those defenses effectively. Iran has demonstrated proficiency in using obscurants and decoys and in deeply burying and protecting key assets, negating the effectiveness of U.S. air strikes with precision weapons.
- Iran's future A2/AD capability will likely include more accurate and mobile ballistic missiles, WMDs, G-RAMM, supersonic anti-ship cruise missiles, mini-submarines, advanced UAVs, and integrated air defenses armed with state-of-the-art SAMs.

In A2/AD, Iran is no China in terms of military capability, but it has advantages that China lacks, particularly in geography.²³ While China has much to defend in a vast region of the Western Pacific, Iran can focus on the 600 mile-long Persian Gulf and specifically the Strait of Hormuz chokepoint. Therefore, Iran can concentrate its growing A2/AD capabilities on a far smaller area if its objective is to make it too costly for the United States to project military power into the region. For

the moment, however, an important similarity between Chinese and Iranian ambitions is that both appear content to capitalize on the proliferating precision weapons regime to strengthen their political and economic status in the region, rather than leveraging that increasing strength to launch military attacks. However, the Democratic People's Republic of Korea (North Korea) does not appear to share that reticence.

A recent study by the Korea Economic Research Institute in Seoul concluded that North Korea's offensive military strategy was superior to the defensive posture of the Republic of Korea (South Korea) and that North Korea was building up its forces to underwrite its doctrine of "military first politics" under Kim Jong-un, its new ruler.²⁴ Rather than constructing an A2/AD capability to deter U.S. power projection, North Korea, faced with the formidable South Korean military on its southern doorstep, has instead adopted an offensive posture that threatens a preemptive strike to unify the peninsula on its own terms. In such a scenario, the U.S. military would become quickly engaged by virtue of diplomatic commitments and the 28,500 U.S. troops that remain in South Korea. U.S. operational plans call for the rapid deployment of American ground, maritime, and air power to the region. As those operational plans are developed and exercised, they need to account for the capacity and capabilities of a rogue state that dedicates much of its

22. *Ibid.*, p. 33.

23. See Andrew F. Krepinevich, "Why AirSea Battle?," Center for Strategic and Budgetary Assessments, February 19, 2010, p. 27, <http://www.csbaonline.org/publications/2010/02/why-airsea-battle/> (accessed August 15, 2012).

24. Jeremy Laurence, "North Korea Military Strategy Superior, Says Think-Tank," Reuters, January 4, 2012, <http://www.reuters.com/article/2012/01/04/us-korea-north-military-idUSTRE8030C820120104> (accessed August 15, 2012).

national resources and nearly all of its international prestige to its military forces.²⁵

- North Korea has a million-man army, of which 70 percent is forward-deployed within 60 miles of the demilitarized zone. Counting reserves and irregulars, North Korea's ground forces are twice the size of South Korea's land army.
- Pyongyang has enough plutonium for six to eight nuclear weapons and has claimed that it has weaponized all of its fissile material. The regime is also pursuing a parallel uranium-based nuclear weapons program, which eventually could augment North Korea's nuclear arsenal.
- North Korea has recently tested anti-ship cruise missiles and new versions of short-range, intermediate-range, and intercontinental ballistic missiles.
- The North Korean government has declared that South Korea is no longer the sole target of its missiles and WMDs.
- North Korea's "four major military lines" of converting the country into a fortress, arming the population, increasing the sophistication of the military, and modernizing its military forces

support the objective of communizing the entire peninsula.

- North Korea advocates a blitzkrieg strategy using a forward-deployed arsenal of self-propelled artillery and multiple rocket launchers that holds the city of Seoul at risk.
- North Korea has forward-deployed roughly 40 percent of its 1,200 fighter aircraft to bolster its air raid capabilities in the initial stages of conflict.
- North Korea has adopted a "juche" strategy calling for a hybrid of Soviet-inspired conventional warfare with Mao's unconventional guerrilla warfare. It has 120,000 special operations forces that are dedicated to asymmetric warfare.
- North Korea has the world's third largest arsenal of chemical and biological weapons.
- North Korea's military is increasing its ability to launch cyber attacks against American and South Korean forces.

The military threat from North Korea should not be exaggerated. Experts and findings from war games point to its aging and outdated equipment, which could fall prey to the more sophisticated air forces of the United States and the

Republic of Korea. In addition, South Korea has been very deliberate in responding to the North's military provocations, such as referring to the sinking of the corvette *Cheonan* and the significant loss of life to the United Nations for investigation. South Korea has also developed an extensive defense reform program to improve its capacity to respond effectively to North Korean provocations. In addition, Seoul created a new Northwest Islands Command and deployed additional forces and sensors to the West Sea, the location of the *Cheonan* attack and artillery shelling of Yeonpyeong Island.

Nevertheless, the provocations have continued, diplomacy has bogged down, North Korea's nuclear capability has continued to increase, and its new, young, and untried leader is clinging to the traditional "military first" policy. Thus, South Korea and the U.S. continue to seek and implement measures that will prevent North Korea's leaders from launching a more serious preemptive attack that could plunge the peninsula into war.

These force planning contingencies should not be taken lightly. While the military balance measured against Iran and North Korea may seem to favor the United States and its allies when compared with the increasing capability of China, regarding these rogue states simply as lesser-included cases would be a mistake. RAND's Project Air Force

25. See Richard Norton-Taylor, "North Korea and South Korea: Military Capacity and Nuclear Capability," *The Guardian*, May 20, 2011, <http://www.guardian.co.uk/world/2010/may/20/north-korea-south-korea-military-nuclear> (accessed August 15, 2012); Koo Sub Kim, "Substance of North Korea's Military Threats and the Security Environment in Northeast Asia," *The Korean Journal of Defense Analysis*, Vol. 21, No. 3 (September 2009), pp. 239-250; and International Institute for Strategic Studies, *Strategic Survey 2011: The Annual Review of World Affairs* (London: International Institute for Strategic Studies, 2011), pp. 370-384. See also Leslie H. Gelb, "North Korea, U.S. Headed to Brink of War, Unnoticed," *The Daily Beast*, April 1, 2012, <http://www.thedailybeast.com/articles/2012/04/01/leslie-h-gelb-north-korea-u-s-headed-to-brink-of-war-unnoticed.html> (accessed August 15, 2012), and Tony Capaccio and Roxana Tiron, "North Korea's Cyberwarfare Strength Grows, General Says," *Bloomberg*, March 27, 2012, <http://www.bloomberg.com/news/2012-03-28/north-korea-s-cyberwarfare-strength-grows-general-says.html> (accessed August 15, 2012).

has conducted in-depth research on what they have defined as nuclear-armed *regional adversaries*: “countries that pursue policies that are at odds with the United States and its security partners, whose actions run counter to broadly accepted norms of state behavior, and whose size and military forces are not of the first magnitude.”²⁶ That research led to an important conclusion that deterring the use of nuclear weapons by either North Korea or a newly armed Iran “could be highly problematic in any plausible conflict situations... for the simple reason that adversary leaders may not believe that they will be any worse off having used nuclear weapons than if they were to forego their use.”²⁷

The implications of the RAND findings for this paper and for building Air Force capabilities and capacities is that the United States military needs to offer high assurance that it can *prevent* these would-be adversaries from using nuclear weapons, rather than *deter* them, as is the case with China. This calls for a modern conventional military force that in contested airspace can hold at risk enemy command and control, WMD, and their delivery systems. It requires high-caliber reconnaissance-strike systems that can locate, pinpoint, and attack hardened fixed targets as well as identifying and attacking targets on the move. In perhaps the most important difference between planning a force to prevent, rather than deter, active defenses will be required to destroy delivery vehicles after their launch, but before they can strike regional bases and ports.

A final threat emanating from these nuclear-armed regional adversaries is that they may proliferate precision-guided weapons and, perhaps, primitive nuclear devices to non-state actors dedicated to carrying out terrorist attacks against American and allied interests.

The Long War: Radical Islamist Terrorism

The “hybrid warfare” model that North Korea practices with its combination of conventional and irregular forces is transferrable to non-state actors, insurgents, and terrorists pursuing an agenda of religious fanaticism and revolution in the Middle East and Africa. The U.S. focus on defeating this radical Islamist movement since 9/11 has resulted in major hybrid, counterinsurgency, and counterterrorist operations in Iraq, Afghanistan, Pakistan, and elsewhere. Recently, with the killing of Osama bin Laden and successful drone strikes against other major al-Qaeda operatives, there has been a sense of “mission accomplished” as U.S. forces have withdrawn from Iraq and are on a downward trend in Afghanistan. However, with a number of Middle Eastern nations trembling from the “Arab Spring” and its aftermath, neglecting the global network of reconnaissance and strike necessary to prevail against this organization, still capable of launching terrorist attacks against the United States, would be a mistake. As the U.S. shifts its strategic attention from the Middle East to the Pacific and begins to rebuild its conventional forces to deter China and prevent the aggression of

regional adversaries, it also needs to maintain watch and, when required, use deadly force to counter terrorist organizations acting against U.S. and allied interests. Evidence of continuing jihadist terrorism is plentiful:

- In Yemen, al-Qaeda in the Arabian Peninsula has increased its control in certain provinces and threatens the central government. If allowed a sanctuary there, al-Qaeda will continue to use Yemen as a base of operations to plan attacks against the U.S. homeland and its regional presence.
- In Somalia, militants of the al-Qaeda affiliate al-Shabaab are expanding their influence in the south and are attempting to recruit Somali Americans to their terrorist cause and tactics.
- Al-Qaeda’s global network has expanded since 9/11, with chapters in Iraq and North Africa. Its presence and influence have recently been noted in supporting rebel forces in Syria.
- Loose arrangements with other terrorist groups, such as Pakistan’s Taliban and Lashkar-e-Tayyiba and Nigeria’s Boko Haram allow al-Qaeda to coordinate attacks of mutual interest and reinforce recruitment of potential suicide bombers in the U.S.
- Attacks by al-Qaeda and its affiliates have increased over the past several years, with more than 200 attacks in Iraq and more than

26. David Ochmanek and Lowell H. Schwartz, *Nuclear-Armed Regional Adversaries* (Santa Monica, CA: RAND Corporation, 2008), <http://www.rand.org/pubs/monographs/MG671/> (accessed August 15, 2012).

27. *Ibid.*

1,000 Iraqis killed since the death of bin Laden.

- In Afghanistan, NATO and congressional assessments offer conflicting reports on the strength of the Taliban following the American “surge.” During 2012, a spring campaign has increased the number of attacks by 31 percent in Kandahar province, and talks on a political settlement with the Taliban appeared to have stalled.
- The Taliban have been known to manufacture more than 8,000 improvised explosive devices (IEDs) in one year—almost 22 per day. One of the most disturbing trends is the apparent Iranian export of a handful of explosively formed penetrators to the Taliban to use against armored vehicles. Explosively formed penetrators have been used against Israeli forces in Lebanon and against the United States in Iraq. The

insurgents also seed poppy and grape fields with roadside bombs to target U.S. and Afghan patrols.

- The U.S. may encounter irregular forces armed with the weapons and tactics that Hezbollah used in its hybrid war against Israel in 2006. Those included barrages of short-range rockets, long-range unguided missiles, mixing civilian vehicles with military hardware, anti-ship cruise missiles, and unmanned air vehicles for ISR.
- Given the proliferation of precision weapons, future conflicts against radical irregulars may include confronting paramilitary forces armed with guided rockets, artillery, missiles—including surface-to-air missiles—and mortars.²⁸

The United States faces “complex irregular warfare” in this long war against radical Islam.²⁹ In such a conflict environment, the U.S. military

sets aside the traditional calculations and movements of “force-on-force” combat and attempts to dominate complex physical, human, and informational terrain. As the U.S. and its allies enter this nontraditional and disaggregated battlespace, there is no requirement to meet the enemy on its own terms. Indeed, the U.S. retrenchment in Afghanistan and Iraq and its recent re-emphasis on more conventional warfighting and adversaries reflect the difficulty that America faces in a counterinsurgency environment in which distinguishing between friend and foe is difficult and winning hearts and minds does not necessarily follow from victory in battle. Nevertheless, the U.S. military can bring its own asymmetric strengths to this conflict, as it has adapted over the past decade, and continue to leverage its advantages of instantaneous access to firepower, force protection, mobility, stealth, and precision in this ever-evolving challenge.

28. See Seth G. Jones, “Al Qaeda Is Far from Defeated,” *The Wall Street Journal*, April 30, 2012, p. A15, <http://online.wsj.com/article/SB10001424052702304723304577369780858510366.html> (accessed August 15, 2012); “Al-Qaeda Is Down, but Far from Out,” *The Economist*, April 21, 2012, p. 75, <http://www.economist.com/node/21553013> (accessed August 15, 2012); Yaroslav Trofimov, “Attacks by Taliban Rise in Surge Areas,” *The Wall Street Journal*, May 17, 2012, p. A8, <http://online.wsj.com/article/SB10001424052702303448404577408042123143860.html> (accessed August 15, 2012); and Ali Almujaheed and Sudarsan Raghavan, “Blast in Yemeni Capital Underlines al-Qaeda’s Reach,” *The Washington Post*, May 22, 2012, p. A1.

29. See International Institute for Strategic Studies, “Complex Irregular Warfare: The Face of Contemporary Conflict,” *The Military Balance*, Vol. 105, No. 1 (2005), pp. 411-420.

Chapter 3

Building a Full-Spectrum Air Force

Deterring China

At the heart of deterring China's military lies the challenge of overcoming the anti-access/area denial capabilities that the PLA is fielding to deny U.S. force penetration into and operations in the Western Pacific region. The U.S. operational concept termed "AirSea Battle" best expresses the joint service response to this challenge.³⁰ Taking a page from the joint operational concept of AirLand Battle that focused on Central Europe during the Cold War, AirSea Battle seeks to unite separate Air Force and Navy plans and doctrine to address the A2/AD challenge and to deter a rising China from military power projection in the Western Pacific. Air Force Chief of Staff General Norton Schwartz explained, "The ultimate goal [of AirSea Battle] is interoperable air and naval forces that can execute networked, integrated attacks-in-depth to disrupt, destroy, and defeat an adversary's A2/AD capabilities, in turn sustaining the deployment of U.S. Joint forces."³¹

To underwrite this operational concept, a number of candidate

AirSea Battle initiatives have been identified to field the necessary forces and capabilities. Those most pertinent to building the Air Force that America needs are:

- Developing and fielding greater penetrating and standoff long-range ISR and precision-strike capabilities and capacities;
- Offsetting the vulnerabilities of space-based C2, communications, and ISR capabilities and capacities by fielding high-capacity airborne C2 relay networks to back up space-based systems;
- Emphasizing future standardization and interoperability of data links, data structures, and C2 and ISR infrastructures;
- Increasing emphasis on and investment in cross-service electronic warfare capabilities and capacities;
- Enhancing cyber warfare offensive and defensive capabilities; and

- Developing and fielding directed-energy weapons.³²

The following makes specific recommendations for building an Air Force capable of supporting those initiatives.

Build the Bomber. A new long-range bomber is the centerpiece for Air Force contributions to AirSea Battle and at the heart of an operational concept designed to overcome China's growing A2/AD capabilities. Current Air Force plans and budgets include a new long-range bomber, but reaching this point has been a long and difficult climb. Despite a series of studies in the 1990s advocating continuing B-2 production and, when that line closed, stressing the need for a next-generation long-range strike system, the best the Air Force could do in 1999 was to establish 2037 as the date for the new bomber's initial operating capability (IOC). The 2006 Quadrennial Defense Review reversed that decision, moving the IOC to 2018, and the 2010 QDR advocated examining options for long-range strike within a "family of systems."³³ Most recently,

30. See Krepinevich, "Why AirSea Battle?," and Jan Van Tol, *AirSea Battle: A Point of Departure Operational Concept*, Center for Strategic and Budgetary Assessments, 2010, <http://www.csbaonline.org/publications/2010/05/airsea-battle-concept/> (accessed August 15, 2012).

31. General Norton A. Schwartz, "Air-Sea Battle Doctrine: A Discussion with the Chief of Staff of the Air Force and Chief of Naval Operations," video, The Brookings Institution, May 16, 2012, http://www.brookings.edu/events/2012/05/16-air-sea-doctrine#ref-id=20120516_schwartz (accessed August 23, 2012). See also General Norton A. Schwartz and Admiral Jonathan W. Greenert, "Air-Sea Battle," *The American Interest*, February 20, 2012, <http://www.the-american-interest.com/article.cfm?piece=1212> (accessed August 15, 2012), and Captain Philip DuPree and Colonel Jordan Thomas, "Air-Sea Battle: Clearing the Fog," *Armed Forces Journal*, June 2012, <http://www.armedforcesjournal.com/2012/05/10318204> (accessed August 15, 2012).

32. Van Tol, *AirSea Battle*, p. xiv.

33. See Robert Haffa and Michael Isherwood, "The 2018 Bomber," Northrop Grumman Analysis Center, August 2008, http://www.northropgrumman.com/analysis-center/paper/assets/The_2018_Bomber_the_case_for_a.pdf (accessed August 15, 2012), and Robert P. Haffa Jr. and Michael W. Isherwood, "Long-Range Conventional Strike: A Joint Family of Systems," *Joint Force Quarterly*, January 2011, pp. 102-107, http://www.ndu.edu/press/lib/images/jfq-60/JFQ60_102-107-Haffa-Isherwood.pdf (accessed August 15, 2012).

the new defense strategy declared in January 2012 called for developing a new stealth bomber as an important component of projecting military power despite A2/AD challenges.³⁴

Now that the program for a new bomber is underway—under considerable wraps owing to its classified nature—a number of issues revolve around it. Some of the most important go to whether the airplane will be manned or unmanned, nuclear or conventional, and part of the larger family of long-range systems or more autonomous. Given these considerations, the Air Force should:

- **Make it optionally manned, but build and test the manned version first.** Because the new bomber will be limited in numbers—perhaps only 100—and incorporate a number of new technologies, including enhanced low observability, developing and testing the aircraft with a human at the controls rather than just in the loop makes sense. The enormous leaps in unmanned air vehicle (UAV) technology since the B-2 was fielded argue for deploying the Long-Range Strike Bomber (LRS-B) primarily as an unmanned system in the mid-2020s. Key to this capability are two UAV subdomains.³⁵ The first is system autonomy, which can be further divided into autonomous

flight management and mission management. Flight management, simply put, means a UAV can now perform core missions, such as sensor employment, from start to finish without human intervention. Mission management technology will enable a small number of human operators to control large numbers of UAVs in different roles and configurations. The second UAV subdomain is autonomous air refueling, which allows ultra-long endurance within defended airspace—endurance required to find and kill moving and relocatable targets. Of course, a human operator remains in the loop in all of these situations, but information technology now being demonstrated suggests that UAVs will have the onboard mission management software enabling them to perform dynamic mission functions without the need for remote human control.

- **Harden the airframe for operations in airspace that might be subjected to electromagnetic pulse (EMP) and wire it for nuclear release, but the Air Force should not declare the aircraft as nuclear-capable.** The principal need for this aircraft derives from its long-range, low observability, precision conventional magazine, and ability to

negate A2/AD measures. Nuclear capability makes the aircraft more difficult to deploy forward (in South Korea and Japan, if not Australia) and, worse than that, throws it into the arms control milieu currently asking Russia and the United States, “How low can you go?” in nuclear weapons and platform reductions.³⁶ The last thing this aircraft needs is to be caught in the trap of arms control negotiations. The Air Force earned its spurs as a separate service because of its ability to field an effective long-range conventional bomber force. It is time to do that again.

- **Position it at the head of the table of a joint family of long-range systems.** The “family of systems” approach advocated in the 2010 QDR seems like a good idea because it seeks to provide the joint commander with a range of options to hold at risk fixed and mobile targets over great distances and in contested environments. However, when the alternatives are compared across the attributes desired in long-range strike—persistent, time-sensitive, multi-target, command and control, standoff, penetrating, and non-kinetic—only the NGS-B rates “green” across the board.³⁷ Moreover, the autonomy inherent

34. U.S. Department of Defense, “Sustaining U.S. Global Leadership,” pp. 4-5.

35. For the interview with retired Lieutenant General David Deptula, see David Axe, “Why the US Wants a New Bomber,” *The Diplomat*, May 6, 2012, <http://thediplomat.com/2012/05/06/why-the-u-s-wants-a-new-bomber/> (accessed August 15, 2012). See also Rebecca L. Grant, “The Case for a New Stealth Bomber,” *Washington Security Forum*, 2012, <http://www.irisresearch.com/case-for-a-new-stealth-bomber?a=1&c=1129> (accessed August 15, 2012).

36. For example, Global Zero advocated an arsenal totaling 900 weapons. Global Zero, “Modernizing U.S. Nuclear Strategy, Force Structure and Posture,” May 2012, http://timemilitary.files.wordpress.com/2012/05/051612_globalzero.pdf (accessed August 15, 2012). See also “The Growing Appeal of Zero,” *The Economist*, June 18, 2011, p. 69, <http://www.economist.com/node/18836134> (accessed August 15, 2012); Thom Shanker, “Former Commander of U.S. Nuclear Forces Calls for Large Cut in Warheads,” *The New York Times*, May 16, 2012, p. 4, <http://www.nytimes.com/2012/05/16/world/cartwright-key-retired-general-backs-large-us-nuclear-reduction.html> (accessed August 15, 2012); and Thom Shanker, “Senator Urges Bigger Cuts to Nuclear Arsenal,” *The New York Times*, June 14, 2012, p. A8, <http://www.nytimes.com/2012/06/15/us/politics/senator-levin-urges-bigger-cuts-to-nuclear-arsenal.html> (accessed August 15, 2012).

37. Haffa and Isherwood, “Long-Range Conventional Strike,” p. 107.

in the unmanned version of the bomber gives it an advantage that few other family members possess. The key point is not to diminish or limit a robust fleet of long-range bombers, either by investment in other capacities and capabilities or by a family member arriving late at the table.

Reopen the F-22 Line. The Air Force originally planned to purchase 700 F-22As to replace the fleet of 800 F-15A-Ds and the recently retired F-117 bomber, but the required number of F-22s was dramatically reduced over the past two decades to 442 in 1993, to 339 in 1997, and finally to 184 in President George W. Bush's fiscal year 2009 defense budget request. Although the Air Force has maintained a requirement for 381 F-22s in recent years, General Schwartz recently noted that the Air Force requires 243 F-22s. Secretary of Defense Robert Gates announced the Administration's intention to end F-22 production at 187 aircraft. On May 2, 2012, the last F-22 was delivered to the Air Force, but it is not too late to restart that production line. The U.S. should restart the F-22 production because:

- 187 F-22 Raptors translates to about 100 to 140 "combat-coded" (battle-ready) F-22s available for operations at any one time. Yet numerous war games and studies have confirmed a minimum requirement for 260 Raptors.
- Although the F-22A is the world's sole fifth-generation fighter, numerous studies have concluded that the platform's quality can be stretched only so far to compensate for a lack of quantity, specifically in a Chinese A2/AD scenario in the Taiwan Strait. Recent war games have concluded that far more numerous, albeit less capable, third-generation and fourth-generation Chinese fighter aircraft would overwhelm projected U.S. fighter forces.
- The considerable U.S. investment in the F-22 program over the past two decades has brought the program to a point where it is now at its most affordable level. After a development cost of \$40 billion, the average flyaway cost of one plane in the 187 buy has dropped to about \$150 million—competitive with the F-35.
- The F-35 is not a substitute for the F-22. The F-22 is a larger and more maneuverable aircraft and was designed to fulfill air dominance missions, thereby clearing the skies for the multirole strike mission of the F-35. The "high-low mix" assumed that enough F-22s would be available to provide air cover for the F-35. Without enough F-22s to eliminate any air-to-air and surface-to-air threats, the F-35 will become increasingly and unnecessarily vulnerable.
- Despite the oxygen-deprivation mystery, the last F-22 lots came off the production line with "zero defects."
- The F-22's avionics, low observability, and supercruise (supersonic flight without use of the afterburner for added thrust) make it many times more capable than the F-35 in accessing a contested airspace, allowing it to engage hostile fighters before it is detected. Its high operational ceiling and speed create an advantage, permitting missile engagement at the maximum range of the AMRAAM and future air-to-air missiles. The combination of supercruise and stealth allow it to penetrate and evade sophisticated air defenses and elude air-to-air threats.
- The decision to end F-22 production at 187 aircraft was based in part on the assumption that other countries would not develop their own fifth-generation fighters for at least another decade. Yet China has already begun testing the J-20, its entrant into the fifth-generation fighter competition.
- The F-22 is designed to establish air superiority in an opponent's airspace without exposing supporting tankers to hostile air defenses. Advanced avionics enable data integration and fusion from multiple sensors, providing the pilot with high-speed data correlation; excellent situational awareness including the locations of friendly, unknown, and hostile aircraft; missile launch detection; and electronic countermeasures.
- Modifications to the F-22 include a synthetic aperture radar, electronic attack, and improved geo-location capabilities to find enemy radars and assist accurate air-to-ground targeting with joint direct attack munitions

satellite-corrected inertially guided bombs.³⁸

Acquire an Advanced Version of the Navy's Unmanned Combat Air Vehicle.

The Air Force has made great progress in building and deploying its unmanned aircraft fleet in the context of the wars in Iraq and Afghanistan, but without an appreciation for the capabilities needed to conduct the same roles and missions in contested airspace.³⁹ As directed by the 2006 QDR and as a result of a number of studies and research efforts, the Navy is making considerable progress in fielding a longer-range, carrier-based UCAV.⁴⁰ The logic supporting its development is every bit as compelling as for the logic driving the U.S. Air Force to prepare for flight operations in a sophisticated A2/AD environment. Like short-range, land-based Air Force fighter aircraft, fighter and attack jets launched from a carrier are best suited for striking targets between 200 and 450 nautical miles from their carriers. At the same time, aircrew endurance limits the ability, even with aerial refueling, to fly combat missions of more than a few hours. A carrier-based UCAV with aerial refueling could stay airborne for 50 to 100 hours—limited only by the life of its operating

systems—allowing it to establish persistent surveillance-strike combat air patrols at long ranges.

The Navy is moving deliberately on their UCAV plans, testing the X-47B demonstrator to inform its plans to field the Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) System by 2018.⁴¹ The Air Force should leverage the Navy's technical progress and capitalize on its doctrinal innovation to develop and field a UCAV designed to underwrite Air Force roles and missions in an A2/AD environment. Such a course makes good sense because:

- The concept of a UCAV, as demonstrated by the U.S. Navy, is mature. High degrees of autonomy, already demonstrated in the Global Hawk ISR UAV and being developed for the LRS-B, will allow the conduct of operational missions with little controller input.
- The UAV's common mission description is to carry out missions that are "dull, dirty (a WMD environment), and dangerous." A fourth "D," particularly relevant to the Western Pacific, is "deep." The range and persistence of unmanned, refuelable fighters allow them to conduct tasks current manned aircraft cannot.

- The UCAVs under development for the Navy are about the size of a fighter aircraft, but could be scaled up to allow even greater range and payload. An Air Force UCAV could also be made stealthier. Somewhat counterintuitively, a larger airframe is more amenable than a smaller one to low-observability design.
- UCAVs can perform long-range bombing campaigns against fixed targets. They also can conduct armed reconnaissance, either passing target coordinates to other strike systems or directly suppressing enemy air defenses. This mission demands great stealth and agility because the UCAV will need to loiter in contested airspace to search for, acquire, and engage fixed and mobile air defenses.
- The UCAV's unique combination of range, endurance, and stealth would be especially critical in deterring China and negating its A2/AD capabilities. UCAVs could be stationed and launched from bases in Alaska, Guam, and Hawaii with plausible additional basing locations in Japan, Australia, and Singapore. This would help to offset China's

38. See Mackenzie M. Eaglen and Eric Sayers, "Maintaining the Superiority of America's Defense Industrial Base," Heritage Foundation *Backgrounder* No. 2276, May 22, 2009, <http://www.heritage.org/research/reports/2009/05/maintaining-the-superiority-of-americas-defense-industrial-base>; Richard B. Andres, "Up in the Air," *The American Interest*, September/October 2010, <http://www.the-american-interest.com/article.cfm?piece=861> (accessed August 15, 2012); Daniel Goure, "Bring Back the F-22," Lexington Institute, January 18, 2011, <http://www.lexingtoninstitute.org/bring-back-the-f-22?a=1&c=1171> (accessed August 15, 2012); Mackenzie Eaglen and Douglas Birkey, "Nearing Coffin Corner: U.S. Air Power on the Edge," American Enterprise Institute, March 21, 2012, <http://www.aei.org/outlook/foreign-and-defense-policy/defense/nearing-coffin-corner-us-air-power-on-the-edge/> (accessed August 15, 2012); and Barry Watts, "The F-22 Program in Retrospect," Center for Strategic and Budgetary Assessments, August 9, 2009, <http://www.csbaonline.org/publications/2009/08/the-f-22-program-in-retrospect/> (accessed August 15, 2012).

39. See Robert P. Haffa Jr. and Anand Datla, "Six Ways to Improve UAVs," *C4ISR Journal*, March 2012.

40. See Thomas P. Ehrhard and Robert O. Work, "Range, Persistence, Stealth, and Networking: The Case for a Carrier-Based Unmanned Combat Air System," Center for Strategic and Budgetary Assessments, June 18, 2008, <http://www.csbaonline.org/publications/2008/06/carrier-based-unmanned-combat-air-system/> (accessed August 15, 2012).

41. "Deck Work," *Aviation Week and Space Technology*, December 6, 2011, pp. 54-57.

advantage in strategic depth and threaten multiple axes of attack.

- The UCAV can function as an enabler for joint “family of systems” strikes by employing it in an ISR, electronic warfare, or offensive cyber-attack role. In the future, the UCAV might be used in air-to-air missions to gain air superiority, leveraging its stealth and maneuverability advantages over manned aircraft.
- Technological advances in unmanned technology being applied in the next-generation bomber program can also be transferred to a fighter-sized aircraft.⁴²

Fortify Space and Cyberspace.

The 2012 DOD Report on China’s military states:

[T]he PRC [People’s Republic of China] is developing a multi-dimensional program to limit or deny the use of space-based assets by adversaries during times of crisis or conflict. In addition to the direct-ascent anti-satellite weapon tested in 2007, these counter-space capabilities also include jamming, laser, microwave, and cyber weapons. Over the past two years, China has also conducted increasingly

complex close proximity operations between satellites while offering little in the way of transparency or explanation.⁴³

The new Joint Operational Access Concept notes that “a logical opening operation to any anti-access campaign is to neutralize U.S. space assets.”⁴⁴ China’s demonstrated capabilities as a space-faring nation differentiate it from other threats and challenges to U.S. national security—a challenge not encountered since the Cold War. Given these capabilities, the Air Force must regard space as another arena of A2/AD and adapt to a degraded environment. This means not only making U.S. space-based systems more numerous and resilient, but also developing and fielding substitutes or alternatives to space-based systems to provide essential C4ISR. Given America’s dependence on space and cyberspace, a major step in mitigating aggression against the U.S. space-based infrastructure is the ability to defeat attacks against those assets and to demonstrate the ability to operate effectively even when enemy action has disabled some of those assets.

The issue areas of space and cyberspace always raise the issue of the “militarization” of space and its ultimate “weaponization.” Quite clearly, space is militarized across a spectrum of roles and missions in

space.⁴⁵ *Space support* refers to the launch of space-based assets and the management of on-orbit satellites that are essential to global military operations and communications. *Force enhancement* refers to the way in which space-based assets improve the effectiveness of operations in other domains: air, land, and sea. The dichotomy occurs between force enhancement, in operation every day, and *force application* from space, which the space-faring nations have thus far avoided.

How long the U.S. and other nations can eschew placing weapons in space is anyone’s estimate. One thorough diagnostic of the military uses of space completed a decade ago doubted any such shift would occur before 2025.⁴⁶ Yet two issues are clear: First, the threats to space-based systems continue to escalate: electromagnetic pulse, direct-ascent anti-satellites, directed energy weapons, and cyber attacks. Second, the new American way of warfare—web-based and net-centric—depends on the global information grid for its joint warfighting capabilities. It is therefore incumbent on the Air Force to fortify its space-based and cyberspace capabilities, while hedging against the risk, probably within the next decade, that force application in and from space will become a reality. Prudent investments in this area include the following:⁴⁷

42. See Ehrhard and Work, “Range, Persistence, Stealth, and Networking,” and Michael Franklin, “Unmanned Combat Air Vehicles: Opportunities for the Guided Weapons Industry?” Royal United Services Institute for Defense and Security Studies *Occasional Paper*, September 2008, <http://www.rusi.org/publications/occasionalpapers/ref:O48BBB2FD81A4A/> (accessed August 16, 2012).

43. U.S. Department of Defense, “Military and Security Developments Involving the People’s Republic of China 2012.”

44. U.S. Department of Defense, “Joint Operational Access Concept (JOAC),” p. 50.

45. See Benjamin S. Lambeth, “Airpower, Spacepower, and Cyberpower,” *Joint Force Quarterly*, January 2011, pp. 46–53, <http://www.ndu.edu/press/airpower-spacepower-cyberpower.html> (accessed August 16, 2012).

46. Barry D. Watts, *The Military Uses of Space: A Diagnostic Assessment*, Center for Strategic and Budgetary Assessments, 2001, <http://www.csbaonline.org/publications/2001/02/the-military-use-of-space-a-diagnostic-assessment/> (accessed August 16, 2012).

47. See Ehrhard, “An Air Force Strategy for the Long Haul,” and Ellen Pawlikowski, Doug Loverro, and Tom Cristler, “Space: Disruptive Challenges, New Opportunities, and New Strategies,” *Strategic Studies Quarterly*, Vol. 6, No. 1 (Spring 2012), pp. 27–54.

- **Enhance the resiliency of space-based capabilities.** A distributed architecture can form a different basis for deterrence by using multiple hosts and smaller platforms, which complicate an adversary's targeting calculus and mitigate the duration of any disruptive effects. Orbital diversity, graceful degradation, rapid recovery, and other reconstitution options will contribute to a more robust space-based network.
- **Build long-haul, high-bandwidth, protected space communications.** The lack of reliable, high-bandwidth communications and data support to forces on the move has been described as a "critical joint force deficiency." The answer to protecting satellite communications is a combination of advanced extra-high frequency (AEHF) satellites and laser satellite communication that was once termed the "transformational satellite" (TSAT) system. Arguments that led to TSAT's cancellation in favor of additional AEHF satellites have mostly been set aside as the supporting industrial base has broadened and the technology readiness levels have matured. More importantly, compared with a strategy deploying large ground forces in Southwest Asia, the current national military strategy focusing on an AirSea Battle in the Western Pacific requires a considerably downsized, and therefore more affordable, TSAT-like system.
- **Field the "objective gateway."** Ensuring redundant and secure communications for forces on the move cannot rely solely on TSAT or another similar laser-based system because lasers cannot easily penetrate clouds or other dense atmospheric systems. Therefore, a fleet of airborne, high-altitude platforms are required to relay the communications from the satellites to the users. This gateway system also provides an important backup for degraded satellites and can counter jamming of communication systems for unmanned systems, thereby mitigating one of the major concerns about autonomous UAVs' ability to perform their missions in contested airspace.
- **Upgrade satellite defensive measures.** Although China destroyed its own aging weather satellite in low earth orbit in 2007, all U.S. satellites should be considered vulnerable, including the global positioning system in mid-earth orbit and geosynchronous satellites in predictable orbits at 22,300 miles above the earth. While enhancing the resiliency of the space-based network through redundancy and atmospheric backup systems will help to guarantee uninterrupted operation of network-centric warfare, specific measures to defend satellites from attack are also required. The U.S. can take a number of steps to protect satellites from attack, including a system dedicated to space situational awareness and warning, low-observable and mobile satellites, passive defenses such as inflatable decoys, and active defenses, including short-pulse lasers.
- **Exploit cyberspace.** The links between operations in space and cyberspace are strong: They are distributed, networked, and global, and they face common threats. Indeed, an attack on U.S. space capabilities may start with cyber attacks within the electromagnetic spectrum or against the information technology infrastructure that forms the backbone of space-based systems. To deter or defend against those attacks, increasing effort in both defensive and offensive cyber capabilities is essential to facilitate joint warfighting. The Air Force needs to work closely with the Defense Advanced Research Projects Agency and with the Cyber Command in the "Plan X" effort to create breakthrough defensive and offensive cyber capabilities.⁴⁸ Particularly troublesome is the prospect of an adversary hacking into and hijacking one of the 3,000 active or inactive satellites in orbit "with the express purpose of colliding with a mission-critical U.S. satellite."⁴⁹ As in the case of the air and space domains, controlling cyberspace or, at least, understanding, anticipating, and responding to the threat, is the sine qua non for ensuring U.S. dominance against any A2/AD challenge.
- **Enhance space situational awareness.** The Air Force will soon declare that the Space Based Surveillance System (SBSS), a satellite designed to look for and monitor space debris, is ready to commence operations. The Air Force launched the SBSS in September 2010, but problems in reporting and verifying

48. Ellen Nakashima, "U.S. Builds a Cyber 'Plan X,'" *The Washington Post*, May 31, 2012, p. A1.

49. Jan Kallberg, "Designer Satellite Collisions from Covert Cyber War," *Strategic Studies Quarterly*, Vol. 6, No. 1 (Spring 2012), p. 131.

space-based data caused a delay in declaring initial operational capability. Space situational awareness, informed by ground systems as well as those in orbit, is essential to taking almost any action required to enhance space support, provide force enhancement, or move to force application from space.

- **Leverage the space plane.** The Air Force should leverage the experience gained through the launch and year-long orbit of the X-37B reusable junior space shuttle and consider increasing the number of X-37s beyond the two currently in its possession. The retirement of the NASA space shuttle and the increasing need for a rapid launch capability for disabled or degraded satellites puts a premium on such a capability that could meet the objectives of “operationally responsive space.”⁵⁰ The Air Force has not disclosed the spaceplane’s orbital activities or the payloads that it carried into space, but the call for smaller and more satellites to provide redundancy in space appears to make continued investment in the X-37 worthwhile.

- **Develop and field a new ICBM by 2030.** The Air Force and the nation need a new land-based intercontinental ballistic missile to replace the obsolescent Minuteman III. This program should be planned to meet the 420 ICBM ceiling specified in the New START treaty, but also consider new modes of basing to enhance survivability in accordance with

the 2010 Nuclear Posture Review. Although designed to match the single-warhead Minuteman in numbers, the missile should include the option of carrying multiple warheads. Given that the Navy’s submarine-based D-5 missile has mutual needs in strategic guidance, rocket motor and propulsion, infrastructure support, and industrial capacity, the Air Force should collaborate with the Navy on missile replacement.⁵¹ Additionally, the new ICBM program should include design features allowing the incorporation of conventional warheads to meet prompt global strike requirements.

Preventing Regional Aggression: North Korea and Iran

As the United States faces an emerging peer competitor in the Western Pacific and seeks to overcome the robust A2/AD capabilities that the PLA is fielding, it also must confront would-be regional aggressors, such as North Korea and Iran, that may be armed with nuclear weapons. Although one might assume that these states’ possession of rudimentary WMDs would not prompt aggression or be seen as a deterrent to external intervention in response to that aggression, such an assumption could prove risky and dangerous. Therefore, in these regional contingencies, the Air Force and its joint partners face the challenge of dissuading and preventing these states from regional power projection, while reducing U.S. vulnerabilities, exploiting their weaknesses, and offsetting their strengths.

As suggested above, these two states have adopted quite different strategies for regime survival, A2/AD, and power projection. Iran’s preferences appear to mirror China’s on a much smaller scale, but they have far less geography to defend. Iran is developing capabilities that could be used to attack U.S. forward-deployed forces, restrict the access of follow-on units to the region, and deny military and commercial shipping access to the area around the Strait of Hormuz in order to leverage their control over the flow of oil. In contrast, North Korea threatens a much more offensive course of action, warning of the bombardment of Seoul and South Korea followed by a land invasion with armored vehicles and special forces designed to grab Seoul—reminiscent of the Korean War of the 1950s, which left the peninsula divided under a tenuous truce.

North Korea’s declared strategy is to use asymmetric warfare, cyber attacks, and its huge arsenal of artillery and ballistic missiles. Artillery would bombard forward-deployed South Korean and American land forces, possibly with chemical weapons. Long-range artillery would target Seoul, land forces in the rear, and bases and ports to the south, conceivably with WMD. Ballistic missiles, possibly with WMD warheads, would attack off-peninsula targets. North Korea has developed a wide range of asymmetric technologies: GPS jammers and camouflage, concealment, and deception techniques, including a tunnel and storage infrastructure that is hardened and deeply buried. North Korea may also have thousands of hackers to launch cyber attacks. Despite the famine and

50. U.S. Department of Defense, “About ORS,” <http://ors.csd.disa.mil/about-ors/index.html> (accessed August 16, 2012).

51. Elaine M. Grossman, “U.S. Air Force Approves Concept for Future ICBM, Eyes Navy Collaboration,” *Global Security Newswire*, June 1, 2012.

shortages that affect the country's civilian and military populations, North Korea's wartime strategic reserves of food, fuel, and ammunition are estimated to last in full-scale war from three months to more than one year.

Iran's growing A2/AD capabilities and North Korea's offensive might present serious military challenges, but they are not yet equivalent to those posed by China. Therefore, projecting such capabilities into the future and proposing an "Outside-In" operational concept to fight from long range in the event such capabilities continue to improve and mature are prudent steps.⁵² However, Air Force planning for the near term should meet the objective of preventing aggression and proliferation by relying on its more traditional doctrine of moving tactical forces to bases around the periphery of these states to establish, with the help of its joint and combined partners, air dominance over the battlespace. Clearly, the long-range capabilities advocated to deter China would assist in a comprehensive, regional theater campaign and could swing to Northeast or Southwest Asia as needed. However, the resources the Air Force needs in these contingencies look much like the forces dedicated to the conventional campaigns in Iraq and Afghanistan over the past decade, albeit upgraded to operate in contested airspace. The objectives of such a campaign are to:

- Dissuade Iran and North Korea from conducting regional aggression through conventional means, while holding at risk their nuclear infrastructure;

- Prevent the successful aggression of either actor if war breaks out by halting the aggression and restoring the *status quo ante*;
- Employ airborne reconnaissance-strike systems that can locate, pinpoint, and attack hardened fixed targets as well as to identify and attack targets on the move;
- Attack enemy command and control, weapons of mass destruction, and their delivery systems in contested airspace;
- Hold the adversary's leadership at risk;
- Prevent the horizontal proliferation of WMDs or precision weapons to other actors that might widen the scope of the war; and
- Defend U.S. and allied regional bases against missile attacks.

The following makes specific recommendations for building an Air Force capable of supporting those initiatives.

Continue the F-35 Program as Planned. Despite the delays, concurrency issues, and cost increases, the Air Force needs all 1,700 F-35 strike fighters to replace the aging F-16, A-10, and F-15E fleets as originally planned. As it comes on line, the F-35 will act as a force multiplier for upgraded F-15 and F-16 fleets facing increasingly hostile A2/AD environments. The current program schedule has the delivery of basic combat capability aircraft in late 2015, followed by full capability baseline software in late 2016, and completion of the development project in 2018

when delivery of the more advanced configuration is expected. Air Force peak production starts then, with 60 aircraft being produced annually. That rate will rise to 80 jets per year by 2021, producing 40 squadrons of combat-coded F-35As (the conventional takeoff and landing variant to be flown by the Air Force) by 2028. The design goals call for the F-35 to be the premier strike aircraft for the Air Force as well as of its joint and combined partners through 2040. The F-35 program should continue as planned for some additional reasons:

- In combat simulations, the F-35 appears four times more effective than legacy fighters in air-to-air combat, eight times more effective in air-to-ground combat, and three times more effective in reconnaissance and suppression of air defenses—while having better range and requiring less logistical support.
- The F-35 brings stealth to the conventional battlespace in numbers required to launch and enforce a tactical air campaign planned for the acquisition and strike of roughly 30,000 targets. The F-35 is designed to launch internally carried bombs at supersonic speed and internal missiles at maximum supersonic speed.
- The F-35 enjoys an electronic edge over every other tactical aircraft in the world that may prove more important in future air combat than maneuverability. This gives it great capacity to adapt to evolving combat conditions, such as the ability to host directed energy weapons. It maintains its stealth

52. Gunzinger, "Outside-In."

throughout any potential modifications by using a fully fiber-optic communications network, ample low-observable sensor apertures, and low-probability-of-intercept antennas. The F-35 also has infrared acquisition and tracking systems that other U.S. aircraft lack.

- The F-35's active electronically scanned array (AESA) radar can be used for electronic attack of enemy air defenses and digital radio frequency memory (DFRM) capabilities, enabling the fighter to spoof or alter radar returns before allowing them to return to the acquisition radar.
- The F-35 program exceeded its flight test goals in 2011 and is ahead of schedule for 2012, yet three previous years of program delays moved 425 aircraft deliveries to later years. Further delays will increase near-term unit costs, impact F-35 acquisition by key U.S. allies, and aggravate total force shortfalls in the active, Guard, and Reserve air fleets.⁵³

Modernize the Legacy Fighter Force. The delays in the F-35 program have resulted in plans to upgrade and extend the service-life of 300–350 Block 40/50 F-16s to about 2030. Unless these aircraft undergo extensive improvements, emerging land-based and air-based

defenses will force them into stand-off roles or their removal from the fight entirely. The F-15 fleet, which lost an aircraft in 2008 to structural fatigue and airframe failure, particularly needs modification and overhaul.⁵⁴ These fourth-generation fighters also need avionics upgrades in order to carry out missions against sophisticated defenses, and all F-15 and F-16 models need phased array (AESA) radars. Targeting pods and infrared search and track capabilities would also increase their contributions in Korean or Iranian scenarios. As it leverages its legacy fighter fleet to prevent aggression by these regional adversaries, the Air Force should also:

- **Upgrade fighter electronic warfare equipment.** Advanced self-protection pods are being developed for the F-16, A-10, and F-15s that would yield higher precision in jamming and greater speed in handling advanced threats in sophisticated air defense environments. Simpler, effective, and affordable modifications include a towed decoy missile warning system and expanded chaff and flare magazines to counter radar and infrared aircraft acquisition. While the F-35 may ultimately prove to be the next airborne electronic attack platform, the Navy should accelerate its “next generation jammer”

program for deployment on these legacy fighter platforms, including the E/A-18G. The latest version of the F-15, in development for Saudi Arabia, has a digital electronic warfare capability that might be adopted by the U.S. F-15 fleet.

- **Acquire new F-16s and F-15s from active production lines.** While upgrades can go a long way, most Eagles and Falcons are already decades past their planned retirement dates, have low mission-capable rates, and are expensive to maintain. As a logical, if unconventional, solution, the Air Force should buy some of the new F-16s and F-15s that are rolling off active production lines for foreign customers. The 4,500th F-16, an advanced block 52 aircraft destined for Morocco was delivered in April 2012, and the manufacturer has a considerable backlog with customers in Turkey, Egypt, Oman, and Iraq waiting. Even more advanced is the Block 60 variant developed for the United Arab Emirates, which features new engines, a state-of-the-art electronic warfare system, an AESA radar, and an integrated forward-looking infrared targeting system. A new export version of the F-15, nicknamed “Silent Eagle,” has a reduced front aspect radar cross section, an AESA radar, and a digital electronic

53. See Eaglen and Birkey, “Nearing Coffin Corner”; Ehrhard, “An Air Force Strategy for the Long Haul”; Jeff Schogol, “Study: AF Lacks Stealth Aircraft to Fight China,” *Air Force Times*, March 28, 2012, at <http://www.airforcetimes.com/news/2012/03/air-force-lacks-stealth-aircraft-to-fight-china-study-says-032812w/> (accessed August 16, 2012); Marcus Weisgerber, “Pentagon Confident in F-35 Buy Schedule,” *Defense News*, March 31, 2012, p. 1; Loren B. Thompson, “Former Deputy Defense Secretary Says Slow Pace of F-35 Is ‘Misguided,’ Costing Taxpayers Billions,” Lexington Institute, May 8, 2012, <http://www.lexingtoninstitute.org/former-deputy-defense-secretary-says-pentagon-slow-roll-of-f-35-is-misguided-costing-taxpayers-billions?a=1&c=1171> (accessed August 16, 2012); General John D. W. Corley and General William R. Looney III, “Real Consequences of Delaying F-35 Program,” *The Washington Times*, May 14, 2012, p. B4, <http://www.washingtontimes.com/news/2012/may/11/real-consequences-of-delaying-f-35-program/> (accessed August 16, 2012); John A. Tirpak, “Washington Watch,” *Air Force Magazine*, July 2011, pp. 8–10, <http://www.airforce-magazine.com/MagazineArchive/Documents/2011/July%202011/0711watch.pdf> (accessed August 16, 2012); and Loren Thompson, “Pentagon’s Best-Kept Secret: F-35 Fighter Program Is Progressing Nicely,” *Forbes*, June 11, 2012, <http://www.forbes.com/sites/lorenthompson/2012/06/11/pentagons-best-kept-secret-f-35-fighter-is-progressing-nicely/> (accessed August 16, 2012).

warfare system. Although some of these avionic modifications can be made to existing F-15s, new “Silent Eagles” will be lighter and more fuel efficient than older modified jets because of their canted tails, digital fly-by-wire, and digital electronic warfare systems, giving them increased range and weapons payload.⁵⁵

Strengthen the ISR Decision

Chain. The “family of systems” approach being adopted in long-range conventional strike also has applications in strengthening ISR collection, processing, exploitation, and dissemination in conventional, but contested airborne environments. A recent review of Air Force ISR capabilities and an Air Force Scientific Advisory Board study drew attention to the role of nontraditional ISR in contested airspace and made the case for modernizing legacy ISR platforms as well as streamlining and strengthening the ISR decision chain. The Air Force should take a number of steps that would contribute to achieving military objectives against regional aggressors:

- **Develop and improve long-range sensors and connectivity for large, non-stealthy manned aircraft that must orbit outside advancing threat rings.** The Air Force has admitted that it cannot put key large platforms such as Rivet Joint, Joint STARS, and AWACS in harm’s way, but

a number of improvements will allow these legacy aircraft to perform their missions in increasingly contested airspace. Developing a network-centric environment, similar to that required to link low-observable platforms in penetrating an advanced A2/AD system, will allow data collected from range to be fused and relayed to engaged forces. Added to this network orientation must be a cultural change from “gathering” to “hunting”—the fusion of ISR forces, command and control elements, and shooters that has proved so effective in permissive airspace over the past decade.

- **Capitalize on lessons learned from the use of fighter aircraft in nontraditional ISR roles.** The Air Force is studying how to adapt the tactics and techniques of nontraditional ISR applied so successfully in Iraq and Afghanistan to contested environments. These efforts will examine the feasibility and utility of using advanced sensors on legacy as well as planned platforms. With upgraded and modified F-16 and F-15 aircraft seen as essential in suppression of enemy air defenses for the next decade, providing those aircraft with advanced sensors, targeting pods used principally for ISR, and connectivity to the integrated broadcast service constellation is an important investment.

- **Upgrade legacy large airborne ISR platforms.** A recent Analysis of Alternatives study conducted by the Air Force determined that future ground moving target indicator (GMTI) sensing would best be accomplished by a combination of the Global Hawk UAV and the E-8C JSTARS, an airborne battle management and ISR platform. While the Global Hawk can operate at altitude over contested airspace, the Joint STARS aircraft needs modifications to accomplish the mission from secure, standoff ranges in the Korean or Iranian scenarios. Those include sensor enhancements to improve target tracking capability and precision location accuracy from greater range and improved VHF communications to enable connectivity at those ranges. New engines on the old 707 airframe will allow improved target acquisition from range because higher altitude equates to increased time on station and longer slant range for its radar and other sensors. AWACS, another aging 707 aircraft used to manage air-to-air combat, also needs upgrades, including a digital flight deck to enable the fleet to meet current and identified future air traffic management requirements.⁵⁶
- **Acquire and field the new airborne tanker.** After a number of false starts and acquisition errors, the Air Force is now on track to

54. Robert Wall and Amy Butler, “Air Force Blues,” *Aviation Week and Space Technology*, November 14, 2011, pp. 37–38.

55. Robert Wall, “Gap Filler,” *Aviation Week and Space Technology*, May 14, 2012, p. 29, and Amy Butler and Robert Wall, “Penetrating Questions,” *Aviation Week and Space Technology*, May 14, 2012, pp. 46–47.

56. See Lieutenant General Dave Deptula and Colonel Mike Francisco, “Air Force ISR Operations,” *Air & Space Power Journal*, Vol. 24, No. 4 (Winter 2010), http://www.airpower.au.af.mil/airchronicles/apj/apj10/win10/2010_4_04_deptula.pdf (accessed August 16, 2012); Guy Norris, “USAF ISR Review Points to Priority Change,” *Aviation Week and Space Technology*, November 30, 2011; U.S. Air Force Scientific Advisory Board, “Non-Traditional ISR for Contested Environments,” 2011, http://www.airforce-magazine.com/SiteCollectionDocuments/Reports/2011/December%202011/Day02/AFSAB_NICE_TOR.pdf (accessed August 16, 2012); David Fulghum, “Embracing Change,” *Aviation Week and Space Technology*, May 14, 2012, pp. 45–46; and Amy Butler, “Best Laid Plans,” *Aviation Week and Space Technology*, February 27, 2012, pp. 31–32.

replace the 1950s-vintage KC-135 with the KC-46A, based on the 767 airframe. This modernization is past due, not only for the Air Force, but also for the joint air forces these tankers support. Based on empirical data derived from the “air bridge” supporting U.S. overseas deployments over the past decade and numerous studies simulating armed conflict in the Western Pacific and Northeast and Southwest Asia, the Air Force still requires about 500 new tankers. Multiple contingencies drive this number: China’s growing A2/AD capabilities that threaten to deprive the joint force of forward bases in the region and the conventional scenarios developed for Korea and Iran, which call for lengthy air campaigns to deliver ordnance against 30,000 aim points. Production of the KC-46A, which can refuel more types of aircraft than the KC-135, may start as early as 2015, with delivery beginning two years later in several tranches, starting with the existing contract for 179 aircraft. The combined risks of an aging fleet, A2/AD challenges, and high-intensity air warfare in contested environments “combine to present a compelling case for tanker modernization.”⁵⁷

■ **Research and develop laser-based missile defenses for regional air bases.** The Air

Force has long outsourced the defense of its air bases to its own security police and the U.S. Army with good reason: The Army was assigned the roles and missions attendant to ground-based air defense, and threats to forward air bases were generally seen as emanating from close-in enemy ground forces that threatened to breach perimeter defenses or launch rocket or mortar attacks from short range. Yet it has always been incumbent on Air Force leadership to ensure the survivability of its bases in order to prosecute the air war.⁵⁸ The situation affecting that responsibility has changed with the threat, particularly when the long-range and increasingly accurate intermediate-range ballistic missile capabilities of North Korea and Iran are factored into planned air operations. While offensive counter-air strikes against missile launch sites may prove more effective than they have in the past—particularly with the strengthened ISR chain—some missiles launched against key air bases in the region will probably find their mark unless the Air Force deploys improved missile defenses. One option is for the Air Force to pursue an air-launched, hit-to-kill capability. One version of such a system would use a stealthy aircraft, such as a B-2 or F-22 to penetrate air defenses to approach

within range of the launch site and then fire a Patriot-like missile to destroy the ballistic missile in its boost phase. Alternatively or in conjunction with an airborne attack, a directed energy weapon could engage the missile in boost phase. Advances in directed energy (DE) weapons suggest that it may be time for the Air Force to assume greater responsibility for air base defense. A recent study suggests that within the next five to 10 years, “it may be possible to use mature laser technologies to create deployable, ground-based weapons to defend forward bases against aircraft, G-RAMM, and ballistic missiles.”⁵⁹ That report suggests that cultural factors, not technological readiness, are the principal barriers to fielding such defenses and urges the Air Force to leverage these technologies to develop DE defenses for bases in Northeast Asia and the Persian Gulf. “Combined with kinetic defenses,” the authors conclude, “a network of DE weapons could shift the cost-imposition calculus in favor of U.S. power-projection forces.”⁶⁰

Develop and Field a Hypersonic Munition. The High Speed Strike Weapon is planned to be an air-breathing, hypersonic round intended to improve the effectiveness of fifth-generation fighter aircraft against growing A2/AD capabilities.

57. Ehrhard, “An Air Force Strategy for the Long Haul,” p. 65.

58. See David A. Shlapak and Alan Vick, “Check Six Begins on the Ground”: *Responding to the Evolving Ground Threat to U.S. Air Force Bases* (Santa Monica, CA: RAND Corporation, 1995), http://www.rand.org/pubs/monograph_reports/2007/MR606.pdf (accessed August 16, 2012), and Christopher Bowie, “The Lessons of Salty Demo,” *Air Force Magazine*, March 1999, <http://www.airforce-magazine.com/MagazineArchive/Pages/2009/March%202009/0309salty.aspx> (accessed August 16, 2012).

59. Mark Gunzinger, “Changing the Game: The Promise of Directed-Energy Weapons,” Center for Strategic and Budgetary Assessments, 2012, p. x, <http://www.csbaonline.org/publications/2012/04/changing-the-game-the-promise-of-directed-energy-weapons/> (accessed August 16, 2012).

60. *Ibid.*, p. xii. See also Defense Science Board Task Force, “Directed Energy Weapons,” U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, December 2007, <http://www.acq.osd.mil/dsb/reports/ADA476320.pdf> (accessed August 16, 2012).

It will be capable of striking time-critical targets from tactically relevant standoff distances in tactically relevant timelines. The research and development must incorporate seeker, guidance, navigation, and control technologies with the goal of mounting a hypersonic ground-attack system on an F-35.

Prevail Against Radical Islam

The long war endures. Since 2001, in response to the 9/11 attacks on the U.S. homeland by radical Muslim terrorists under the leadership of al-Qaeda, the United States has led coalitions of armed forces to defeat terrorism and the states and non-state actors that sponsor and conduct terrorist attacks on American interests and allies in Iraq, Afghanistan, Pakistan, Yemen, Somalia, and elsewhere. The strategy has shifted as the U.S. de-emphasizes its large ground presence and seeks to substitute technology for manpower in counterterrorist, rather than counterinsurgency, operations. But the objectives remain to prevail against those seeking to harm the United States through terrorist, asymmetric, and possibly catastrophic means.

Although the U.S. military presence in Iraq has ended, America will stay involved in Afghanistan and its environs for some time. A recent NATO summit ratified roughly \$3.6 billion in economic support per year for 10 years. NATO will provide nearly 2,000 military trainers for Afghan security forces, and an additional 20,000 U.S. military personnel will

remain in-country providing battle-field enablers such as aerial surveillance, close air support, and logistic mobility.⁶¹ As the Afghan campaign winds down or, at least, transitions, other trouble spots will likely flare up. The U.S. will certainly think twice before attempting to insert a large ground army in the Middle East or Africa to defeat terrorism, quell proliferation, foment democratic revolution, or change a regime. Nevertheless, the U.S. will still need major efforts to prevail against the Taliban or any other actor that allows a sanctuary for al-Qaeda or its offspring. A number of Air Force capabilities and capacities will prove essential as this long war continues, and successful counterterrorism operations will require a number of enhancements that are referenced in the 2010 QDR:

- Expanded manned and unmanned aircraft systems for ISR;
- Expanded intelligence, analysis, and targeting capacity;
- Improved capabilities to counter IEDs;
- An expanded and modernized AC-130 fleet; and
- Increased key enabling assets for Special Operations Forces (SOF).⁶²

The following makes specific recommendations for building an Air

Force capable of supporting those initiatives.⁶³

Focus Layered ISR on Counterterrorist Operations. As the American and allied presence on the ground declines and situational awareness of an elusive enemy is correspondingly degraded, integrated, multisource intelligence gained through layered airborne ISR systems becomes more important to counterterrorism operations. An Air Force emphasis on expanding ISR qualities and increasing ISR capacity will help to overcome that shortfall. Focusing ISR on complex irregular warfare calls for improving the types and qualities of sensor systems and increasing the number of orbits by airborne assets to cover large swaths of territory in distant regions and variable terrain.

- **Improve Moving Target Indication capability.** A recently completed Air Force analysis of alternatives found that a combination of the Block 40 Global Hawk UAV and a new business-class jet as an ISR platform would provide the highest performing alternative to track moving ground targets from overhead. As those findings are assessed and platforms considered, the Air Force must modernize the E-8C JSTARS fleet with new engines and sensor modifications to improve performance, and field the Global Hawk with its sophisticated multiplatform radar technology insertion program (MP-RTIP) radar.

61. North Atlantic Treaty Organization, "Chicago Summit Declaration on Afghanistan," May 21, 2012, http://www.nato.int/cps/en/natolive/official_texts_87595.htm (accessed August 16, 2012).

62. U.S. Department of Defense, *Quadrennial Defense Review Report*, February 2010, pp. 21-25, http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf (accessed August 16, 2012).

63. See Michael Isherwood, "Layering ISR Forces," Mitchell Institute for Airpower Studies *Mitchell Paper* 8, December 2011, http://www.afa.org/mitchell/reports/MP8_ISR_1211.pdf (accessed August 16, 2012).

■ **Increase orbit capacity and sensor capability on remote-controlled aircraft (RPA) and other platforms.** The success of the MQ-1 Predator and MQ-9 Reaper in Iraq and Afghanistan has prompted a program that appears sufficient for target reconnaissance and strike in uncontested airspace for the near to mid-term. By 2020 the planned inventory of RPAs will allow for a surge capability of 89 separate orbits if necessary and a doubling of valuable full-motion video to roughly 1,600 hours per day. As the Air Force considers the future applicability of other “quick reaction capability” programs developed for recent contingencies, two programs—Gorgon Stare and Blue Devil—are worthy of continued investment. Gorgon Stare is a sensor suite of electro-optical and infrared capabilities that vastly increases the Reaper’s imagery collection capabilities and expands the typical narrow “soda straw” video view. Blue Devil Block 1 is a suite of high-definition imagery sensors mounted on modified executive aircraft, integrating wide-area and narrow-field-of-view sensors cued by advanced signals intelligence sensors. The technology reportedly has been very effective in identifying “high-value individuals” and IED emplacements.⁶⁴ Blue Devil II, which has run into development challenges, is an airship designed to carry a 2,500-pound ISR payload including the improved electro-optical and

signals intelligence sensors. The concept of parking an airship over an area of concern in uncontested airspace to collect continuous intelligence with coherent change detection shows great promise for layered ISR systems supporting counter-IED operations.

■ **Increase Targeting Capacity for Irregular Warfare.** The Air Force oversaw the explosion of investment in ISR sensors and platforms over the past decade in support of operations in Iraq and Afghanistan, but it did not pay enough attention to integrating and leveraging those assets. Better integration and exploitation of a wide range of intelligence products is required as well as developing tools and organizational concepts to exploit the layered intelligence picture.

■ **Streamline ISR processing.** The recently completed ISR review revealed that the Air Force has a capacity problem in processing the data collected by its overhead information-gathering platforms. A RAND study found that the Air Force would need more than 100,000 analysts by 2016 to process all of the information flowing from its ISR platforms. The Air Force needs a plan to bring the Distributed Common Ground Station into the future, equipped with the computerized fusion and processing capabilities to relieve humans of constantly staring at full-motion video. In addition, the Air Force needs a new

roadmap to speed intelligence processing, exploitation, and dissemination tools to leverage the progress gained by coupling sensor and shooter platforms, as in the Predator and Reaper. Then, it needs to apply those tools to new systems. ISR and strike operations must become increasingly integrated to acquire and target time-sensitive targets.⁶⁵

■ **Rebuild targeting capability and capacity.** NATO’s air campaign over Libya revealed not only great reliance on U.S. C4ISR assets to carry out daily operations, but also severe shortages in Air Force targeting capacity to execute the mission.⁶⁶ The Air Force has acknowledged that personnel with targeting expertise were pushed out to the major combatant commanders and away from net-centric Air Force operations over the past decade and were tasked with different functions when combat targeting was not required, thus losing the expertise required. The Air Force will need to invest in recruiting and training personnel to use multisource, layered ISR assets in the selective targeting demanded by counterterrorism operations.

Add Airborne Capacity and Capability to Enable Counterterrorism Operations.

The Pentagon is about to launch another comprehensive mobility study to reduce Air Force strategic and tactical airlift fleets based on the new national defense strategy

64. See Steven H. Walker, “Status and Health of the Department of Defense (DoD) Science and Technology (S&T) Laboratory Enterprise,” statement to the Subcommittee on Emerging Threats and Capabilities, Committee on the Armed Services, U.S. House of Representatives, April 17, 2012, <http://www.armed-services.senate.gov/statemnt/2012/04%20April/Walker%2004-17-12.pdf> (accessed August 16, 2012).

65. See Robert P. Haffa Jr. and Jasper Welch, “Command and Control Arrangements for the Attack of Time-Sensitive Targets,” Northrop Grumman Analysis Center, November 2005, <http://www.northropgrumman.com/analysis-center/paper/assets/Time-Sensitive-Targets.pdf> (accessed August 16, 2012).

that calls for smaller ground forces and, presumably, lower air mobility requirements. However, far-flung counterterrorism operations and rapid deployment requirements may add to the million ton-miles per day calculations. The Air Force has recommended that any new study also consider factors such as intra-theater requirements, aerial refueling, time-sensitive delivery to maneuver forces, and prepositioned equipment. The Air Force's capability to support U.S. and allied ground forces on the move in irregular warfare scenarios needs a number of enhancements:

- **Recapitalize special-mission aircraft.** Air Force Special Operations Command has fielded 23 of its 50 planned CV-22 Osprey tilt-rotor aircraft, providing unmatched speed and range to SOF battlefield commanders. Additional improvements include modifying 12 MC-130Ws with a precision strike package and fielding AC-130J gunships to replace legacy AC-130 platforms. Another needed improvement is replacing aging MC-130E and MC-130P special-mission aircraft with the MC-130J.
- **Reverse the C-27 decision.** The C-27J is a propeller-driven tactical airlifter with similar cruise performance to the C-130, slightly less range and cargo-carrying capability, and the ability to land on short or unimproved runways. It was originally intended as a joint Army–Air Force combat aircraft, with the Army as the program lead, but the Air Force

was given the mission and the program in 2010. Since then, budgetary pressure and C-130 availability in Afghanistan made the program appear superfluous, but increasing requirements to move small and special forces using remote, short, and unprepared runways, plus emerging requirements for the rapid deployment of special operations forces, make the C-27's capabilities particularly attractive for counterterrorism operations.⁶⁷

Recommit to the Total Force.

The Air Force understandably wants to recapitalize the active force while reducing the personnel and operational tempo absorbed by its Guard and Reserve components during the irregular wars of the past decade. Yet Congress rejected as disproportionate the proposed cuts of 5,000 people and 200 aircraft from the Guard to rebalance that effort. Modernization of the Guard and Reserve is essential to enhance recruitment and retention and to keep ready the expertise generated during constant rotations to Iraq and Afghanistan. The Guard and Reserve can continue to relieve pressure on the active component by focusing on homeland defense and humanitarian support missions, adjusting fighter force manpower, maintaining a lowered rotational requirement in support of counterterrorism operations, and divesting legacy aircraft in favor of more modern platforms, including unmanned systems. A number of initiatives appear promising:

■ **Focus on homeland defense and**

humanitarian support. The Air National Guard has been the principal contributor to Operation Noble Eagle (Air Control Alert or ACA), the strip alert, and combat air patrols conducted over and near major American cities since 9/11. The Guard will continue to perform that role, operating 66 of its 89 wings of aircraft from civilian airfields at considerable cost savings compared to the operation of a major Air Force base. Given those savings, it is difficult to argue that the active Air Force component should take a larger role. However, the Air Guard should seek contributions from Naval and Marine aviation, particularly aircrews trained in air-to-air missions who are stationed at land bases near major metropolitan areas. The Air National Guard, under its Title 32 responsibilities under the command and control of state governors, will also continue its important contributions to humanitarian aid and disaster relief and should be equipped appropriately, including C-130s transferred from the active force.

- **Adjust fighter force manpower.** The Air Force should continue and expand its associate relationship with Guard and Reserve fighter units to capitalize on the experience found in the total force and to mix and match the split needs of maintaining proficiency and preparing for deployments. In addition to giving younger active pilots more flying time with seasoned instructors, the associate relationship also leverages

66. Eric Schmitt, "NATO Sees Flaws in Air Campaign Against Qaddafi," *The New York Times*, April 15, 2012, p. A1, <http://www.nytimes.com/2012/04/15/world/africa/nato-sees-flaws-in-air-campaign-against-qaddafi.html> (accessed August 16, 2012).

67. See Julian E. Barnes and Adam Entous, "U.S. Seeks Faster Deployment," *The Wall Street Journal*, May 8, 2012, p. 7, <http://online.wsj.com/article/SB10001424052702303630404577390333494738036.html> (accessed August 16, 2012).

the advantages of Guard maintenance. A RAND study found that ANG maintenance organizations constantly outperformed active unit squadrons in generating more peacetime flying hours per person.⁶⁸

- **Maintain the rotational base for counterterrorist deployments.** Once called to duty in wartime, an activated Reserve unit will deploy like any other unit. Both Guard and Reserve components have played important roles in maintaining the rotational base for Air Force deployments over the past decade. With U.S. forces out of Iraq, withdrawing from Afghanistan, and de-emphasizing long-term stability operations, the demand for

these rotational requirements will diminish. As it does, the Guard and Reserve, with the experience and assets dedicated to low-intensity operations in relatively uncontested airspace, may be able to absorb a greater percentage of these deployments at their own more leisurely deploy-to-dwell ratio, freeing the active force for the high-intensity A2/AD deployments envisioned in the Western Pacific.

- **Divest legacy systems.** One of the reasons that recently proposed force cuts seem to fall disproportionately on the Air National Guard is because the Air Force decided to divest single-mission aircraft such as the A-10. However, as those legacy

aircraft are retired, new aircraft and missions can be transferred to the Guard and Reserve, again with an eye on counterterrorist operations in Southwest Asia and Africa. The decision to transfer the MC-12 fleet to the Guard supports this strategy as would reversal of the C-27J decision, putting it back in the hands of the Guard to accomplish short-haul, light-load airlift to unimproved landing strips. When moving a fleet of F-16s from one Guard or Reserve unit to another seems to be a wise economic move, replacing those fighters with unmanned aircraft, such as the Block 30 Global Hawks, which may otherwise be mothballed, would reinvigorate the Guard and strengthen the total force.

68. See Ehrhard, "An Air Force Strategy for the Long Haul," pp. 90–93, and Aaron M. U. Church, "The Associate Push," *Air Force Magazine*, June 2012, pp. 44–47, <http://www.airforce-magazine.com/MagazineArchive/Pages/2012/June%202012/0612push.aspx> (accessed August 16, 2012).

Conclusion

This study has offered three perspectives:

1. The international security environment poses considerable challenges to America's vital interests,
2. The U.S. Air Force is inadequately prepared to meet those challenges, and
3. The nation cannot successfully underwrite its foreign and defense policy objectives without increased investment in Air Force capacities and capabilities.

A number of sources support the first thesis. The defense intellectual community—including the Pentagon, the Administration, Congress, and academe—generally agrees that maintaining the U.S. military's dominance is vital to protecting U.S. interests and those of its allies and friends at home and abroad. While the number and character of these threats can be expansive, if restricted to U.S. security concerns related to military threats from other actors in the international system, deterring China, preventing regional aggression by new nuclear actors, and prevailing in the war on terrorism dominate the conflict spectrum facing U.S. military force planners. One can hope that China will continue its peaceful rise, that the regimes in North Korea and Iran will succumb to domestic revolt and revolution before they assault their neighbors, and that Arab nationalism and moderate Islam will mitigate the

radical sects in their countries and religion and lead them to peacefully resolve their internal and external disputes and differences. But hope is not a reliable strategy for force planners.

The second contention is perhaps more argumentative because it raises the perennial question in defense studies of "how much is enough?" Nevertheless, it is difficult to oppose the conclusion that the Air Force is ill prepared to deter, prevent, and prevail in the contingencies suggested above. The blame for this condition can be shared widely, but the facts remain the same. The Air Force is operating a fleet of aircraft with an average age of more than a quarter of a century. It has deferred major acquisition programs for three decades. It possesses only 20 "modern" bombers and a handful of fifth-generation fighters. Because of internal stumbles, procurement holidays, and a global war on terrorists and insurgents, it missed the promise of a military-technical revolution. Would-be adversaries have taken advantage of these lapses and have created zones of anti-access and area denial that would deny to the Air Force and its joint warfighting partners the tactics and techniques of forward deployment and employment that have provided the foundation for U.S. military dominance during the Cold War and since. The playing field of international armed conflict no longer tilts in America's favor, and it promises to slide further away if the U.S. does not alter some very unfavorable trends.

The third section of the study may strike many as thorough, but unrealistic. It is fashionable for current think-tank studies making the rounds within the Beltway to argue that maintaining or increasing current levels of defense spending would be a mistake in this time of austerity and deficits. Instead, they suggest a number of remedies: The Department of Defense can operate more efficiently and effectively, generating considerable savings. Weapons acquisition can be reformed. Jointness should be enhanced and redundancy attacked. Leap-ahead technologies need to be championed. Perhaps some of this will occur. This study has taken the approach of outlining the capabilities and capacities that the Air Force requires to underwrite the declared security and defense policies of the United States without crunching numbers, making tradeoffs, or computing cost-effectiveness. This paper briefly referenced John Gaddis's Cold War analysis of the strategies of containment. During that period, strategies were shifted to match perceived resources with objectives by adopting what Gaddis termed as "symmetric" or "asymmetric" means. One of those asymmetric strategies, when national solvency became paramount, was emphasizing the nation's air power. Such a strategy appears to have a contemporary application.⁶⁹

The suggestions offered in the third chapter of the study might be considered as something akin to the joint "Planning Force" of old that was unconstrained by budget ceilings.

69. Gaddis, *Strategies of Containment*.

It also might resemble the late and lamented “Unfunded Priorities List,” which the Armed Services used to lobby for some of their favorite platforms and systems that did not make it into the President’s budget. Others might say this would be a good starting point for congressional “earmarks,” if they were still around. Finally, some will deride the chapter as the worst possible product of Pentagon planning: the laundry list. Yet all of these proposals are desirable and feasible.

In its own force planning and program development, the Air Force has undoubtedly considered all of the options presented in this paper, but could not include them under fiscal guidelines.

The planning contingencies are not new, and the capabilities and capacities recommended here are not, for the most part, revolutionary. The Air Force leadership has made tough choices in trading off readiness, modernization, and force structure. More tough decisions lie ahead.

Therefore, a few concluding recommendations in terms of priorities are warranted.

- **The biggest threat to U.S. national security interests in the near term is the growing military and nuclear power of North Korea and Iran, two rogue states and would-be regional aggressors.** Therefore, the recommendations made within that section should be granted some priority: continuing with the F-35 program, modernizing the legacy fighter force, strengthening the ISR chain, acquiring the tanker, developing a hypersonic missile, and focusing on air base defense against ballistic missiles.
- **The next threat, more uncertain and longer term, is China’s growing A2/AD capabilities.** The declared national strategy and the priorities planned for the “pivot” to the Pacific and the AirSea Battle operational concept

provide the right direction for Air Force investments in this contingency. The Air Force has time to build the new bomber, capitalize on the Navy’s UCAV, fortify space and cyberspace, and develop a new ICBM, but it should not delay in reopening the F-22 line.

- **The shift in strategy from counterinsurgency to counterterrorism also provides the Air Force with sound guidance to prioritize its investments.** Focused and layered ISR, increasing targeting and airborne capacity dedicated to counterterrorism operations, and leveraging the contributions of the Air National Guard and Reserve will all contribute to prevailing in this ongoing conflict.

The decline of the U.S. Air Force is a choice, not a fate.

Glossary of Terms

- AESA Active electronically scanned array. An AESA radar (also called phased-array radar) utilizes numerous transmit/receive modules to increase radar power and cover a range of frequencies and targets while allowing stealthy operations.
- ANG Air National Guard. The Air National Guard is the Air Force component of the National Guard and in that capacity performs both federal and state missions. For example, the ANG has total responsibility for the air defense of the United States. Under state law, the ANG reports to the governors of their respective states and provides protection of life and property through emergency relief support during and following natural disasters.
- AWACS..... Airborne Warning and Control System. The Airborne Warning and Control System (the E-3 Sentry) is a platform derived from the Boeing 707. It provides all-weather surveillance, command, control, and communications and is used to manage airborne assets during combat operations.
- AirSea Battle..... In September 2009, the Air Force Chief of Staff and the Chief of Naval Operations signed a classified memorandum to initiate an effort to develop a new operational concept termed “AirSea Battle.” This effort focuses on the rising challenge to the ability of the U.S. military to project power into regions in which potential adversaries possess anti-access/area denial capabilities.
- A2/AD Anti-access/area denial. Anti-access/area denial refers to the ability of a potential military adversary to prevent U.S. forces from penetrating an operational area (anti-access) or denying them the ability to operate effectively within that region (area denial). These capabilities include ballistic missiles to attack regional bases, integrated air defense systems, precision-guided munitions, and electronic warfare.
- C2..... Command and control. “The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.”⁷⁰
- C4ISR..... Command, control, communications, computers, intelligence, surveillance, and reconnaissance. C4ISR combines the concepts of command and control with the necessary communications, computers, and reconnaissance and surveillance assets that provide situational awareness and actionable intelligence of a battlespace.
- DE Directed energy. Directed energy, if it is weaponized, can be focused on a target to inflict damage. Instead of using a projectile, directed energy warfare uses electromagnetic radiation, particles, or sound.

70. U.S. Department of Defense, *Dictionary of Military and Associated Terms*, November 8, 2010, amended through August 15, 2012, s.v. “command and control,” http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf (accessed September 13, 2012).

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- EMP Electromagnetic pulse. “The electromagnetic radiation from a strong electronic pulse, most commonly caused by a nuclear explosion that may couple with electrical or electronic systems to produce damaging current and voltage surges.”⁷¹
- Fifth-generation aircraft..... Compared with fourth-generation aircraft, the primary advantage of fifth-generation aircraft (e.g., F-22 and F-35) is their incorporation of advanced electronic and technological capabilities. Key components of the fifth-generation fighter are overall stealth, low probability of intercept radar, advanced avionics, and integrated computer systems.
- Fourth-generation aircraft..... Fourth-generation aircraft refer to the ‘teen series (F-14, F-15, F-16, and F-18) of fighter aircraft, which excelled over their predecessors in maneuverability, digital computers and system integration techniques, and system upgrades.
- G-RAMM Guided rockets, artillery, mortars, and missiles. The proliferation of precision weapons technologies suggests that weapons previously limited to indirect attack on key facilities, such as airfields, may soon have the capability to strike individual targets with precision over both short and long ranges.
- IED Improvised explosive device. An IED, often referred to as a roadside bomb, is an explosive device constructed and deployed in ways other than conventional military action. Insurgents in Iraq and Afghanistan have used them extensively to target coalition forces, causing more than 60 percent of the forces’ casualties.
- LRS-B..... Long-Range Strike Bomber. The Department of Defense has announced that it will procure 80 to 100 new penetrating bombers with estimated initial operational capability in the mid-2020s. This aircraft is also referred to as the “next-generation bomber” (NGB).
- Operationally responsive space .. The ability to address emerging, persistent, and/or unanticipated needs through timely augmentation, reconstitution, and exploitation of space force enhancement, space control, and space support capabilities.
- Orbital diversity Orbital diversity is the use of multiple satellites and ground communications systems to gather information over a large area.
- PLA..... People’s Liberation Army. The PLA is the unified military organization of all land, sea, strategic missile, and air forces of the People’s Republic of China. It is the world’s largest military force.
- QRC..... Quick reaction capability. Quick reaction capability is the ability to deliver a project in less time than would normally be expected in which cost is a secondary consideration to production and deployment of the item—often to meet an urgent operational need.
- Rivet Joint RC-135 V/W. The RC-135 V/W is the Air Force’s standard airborne signals intelligence aircraft. It can detect, identify, and geo-locate various signals throughout the electromagnetic spectrum.

71. Ibid., s.v. “electromagnetic pulse.”

- SAM Surface-to-air missile. SAMs are launched from the ground at a target in the air, either an aircraft or another missile.
- Space force application..... “Combat operations in, through, and from space to influence the course and outcome of conflict. The space force application mission area includes ballistic missile defense and force projection.”⁷²
- Space force enhancement “Combat support operations and force-multiplying capabilities delivered from space systems to improve the effectiveness of military forces as well as support other intelligence, civil, and commercial users. The space force enhancement mission area includes: intelligence, surveillance, and reconnaissance; integrated tactical warning and attack assessment; command, control, and communications; positioning, navigation, and timing; and environmental monitoring.”⁷³
- UAV Unmanned aerial vehicle. A UAV is an aircraft that flies without a human pilot and is controlled remotely, with varying degrees of autonomy.
- UCAV Unmanned combat air vehicle. A UCAV is a drone designed to deliver weapons and attack targets while under human control. For example, the Predator and Reaper have been employed for such attacks in uncontested airspace, and new designs are being developed for use in high-threat environments.
- WMD Weapons of mass destruction. WMD can be biological, chemical, nuclear, or radiological devices designed to inflict massive casualties.

72. *Ibid.*, s.v. “space force application.”

73. *Ibid.*, s.v. “space force enhancement.”



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