CSBA

Center for Strategic and Budgetary Assessments

PIERCING THE FOG OF PEACE

DEVELOPING INNOVATIVE OPERATIONAL CONCEPTS FOR A NEW ERA

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Cover: The U.S. Navy aircraft carriers USS Saratoga and USS Lexington off Diamond Head on February 2, 1933 while both ships were awaiting the official beginning of exercise Fleet Problem XIV. U.S. Navy Photo.

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The 2018 *National Defense Strategy* (NDS) and the Congressionally-mandated 2018 National Defense Strategy Commission refocused U.S. defense planning on the reality of competition and the possibility of conflict with China and Russia and highlighted the urgent need to address eroding military balances and growing operational challenges through the development of innovative operational concepts.[1] Although additional resources are clearly required to meet near-term challenges and modernize for competition and conflict in the 21st century, bigger budgets will likely prove insufficient to support the national defense strategy without innovative operational concepts that can bridge the gap between our ends and our means. This paper is meant to stimulate discussion of, and ultimately spur action to develop, the concepts and capabilities the United States will need to prevail in a more dangerous world.

U.S. Great Power Competition with Imperial Japan

For the United States to prepare for great power competition, it is useful to examine a previous period during which the United States dealt with a great power rival: Imperial Japan during the first four decades of the 20th century. Then, as now, the United States faced an ambitious rising power in East Asia during a period of rapid technological and doctrinal change.[2] The U.S. solution to this problem was War Plan ORANGE, a plan for a single-theater war in the Western Pacific between the United States and Japan initially based upon a rapid U.S. trans-Pacific naval lunge to defend U.S. possessions, primarily the Philippines, against Japanese

1 DoD, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: DoD, 2018), p. 2, available at https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf; National Defense Strategy Commission, *Providing for the Common Defense: the Assessment and Recommendations of the National Defense Strategy Commission* (Washington, DC: U.S. Institute of Peace, 2018), p. 10.

2 On Japanese grand strategy, see S. C. M. Paine, *The Japanese Empire: Grand Strategy from the Meiji Restoration to the Pacific War* (New York: Cambridge University Press, 2017). See also Michael A. Barnhart, *Japan Prepares for Total War: The Search for Economic Security, 1919–1941* (Ithaca, NY: Cornell University Press, 1987); Sadao Asada, *From Mahan to Pearl Harbor: The Imperial Japanese Navy and the United States* (Annapolis, MD: Naval Institute Press, 2006); and Joe Maiolo, *Cry Havoc: The Arms Race and the Second World War* (London: John Murray, 2010)..

aggression. From there, U.S. forces would defeat Japan by "isolation and harassment" against "her naval forces and economic life."[3]

Shifts in the global balance of power during the 1930s caused the U.S. Army and Navy to reconsider their planning assumptions. The increasing sophistication of the Imperial Japanese Navy caused War Plan ORANGE to shift to a protracted, sequential campaign to recover territories like the Philippines, which would now likely fall to the Japanese before help could arrive. New technologies like long-range bombers and submarines forced planners to grapple with the possibility that the U.S. homeland would not be secure in a future war. The expansion and aggression of fascist powers in Europe confronted the U.S. Army and Navy with the need to plan for a two-theater war, as well as the increasing likelihood that the United States would not fight alone, but rather as part of a coalition. By 1939, a new series of war plans, dubbed RAINBOW, for a multi-theater coalition war began to take shape. RAINBOW 5—a variant where Germany, not Japan, was the primary adversary—would become the basic U.S. plan for World War II.

Emerging Chinese Threat Trends

Today the center of world economic gravity is shifting from Europe to Asia, where China's growing economic, political, and military influence threatens to dominate the region and marginalize the United States. China's military continues to expand and develop rapidly toward its goal of being able to fight and win "informatized local wars." This modernization, particularly in the realm of theater strike, is eroding many areas of U.S. military superiority.

The immense distances between the United States and the European and Asian continents makes it difficult for the United States to project power across the oceans and deploy military personnel and equipment quickly, efficiently, and safely in the event of conflict. To mitigate this time-distance problem, the United States has relied on forward deployed forces and bases and a system of multilateral alliances, backed by highly capable power projection forces designed to deploy rapidly from the continental United States (CONUS) and deliver a decisive blow to an adversary. These power projection forces, particularly U.S. carrier air wings, theater and global strike aircraft, and Marine expeditionary forces, serve as the foundation of U.S. deterrence and reassurance in Asia.[4]

China's continued economic growth, expanding defense budget, and military modernization have allowed the People's Liberation Army (PLA) to build an increasingly sophisticated anti-access/area denial (A2/AD) network. This network is designed to chip away at U.S. military dominance in the Indo-Pacific; negate U.S. advantages in power projection; and hold U.S. and

3 Joint Army-Navy Basic War Plan ORANGE, 1924, Joint Board (JB) 325, Ser. 228.

4 Thomas G. Mahnken, "U.S. Strategy: Confronting Challenges Abroad and Constraints at Home," in Ashley J. Tellis, Alison Szalwinski, and Michael Wills, eds., *Strategic Asia 2017–18: Power, Ideas, and Military Strategy in the Asia-Pacific* (Seattle and Washington, DC: National Bureau of Asian Research, 2017).

allied air bases, ports, facilities, and personnel at risk. The core component of this strategy is China's possession of the world's largest arsenal of ground-launched, theater-range cruise and ballistic missiles capable of striking both land and sea targets thousands of kilometers from the Chinese mainland. These ground-based missiles are being augmented by a new generation of Chinese airborne theater-strike assets, including two new stealth bombers, longer-range H-6 variants, and an air-launched ballistic missile (ALBM). Lastly, China has heavily invested in the wide-area surveillance and targeting capabilities necessary to close the circle and guide these strike assets to their targets.[5]

The PLA's integrated air defense system (IADS) architecture acts in synergy with the offensive missile systems it defends. Chinese missile strikes against U.S. and allied air bases and naval forces suppress the U.S. ability to marshal its forces and deliver decisive striking power, while Chinese IADS push remaining non-stealth U.S. forces away from the Chinese homeland. The 5th generation stealth fighters and long-range air-to-air missiles which China has in development pose an increasing threat to U.S. high-value air assets like airborne early warning and control (AEW&C) and aerial refuelers, which facilitate the reach and coordination of U.S. fighter aircraft in theater. Altogether, these A2/AD capabilities could greatly degrade the U.S. ability to carry out its preferred concepts of operations in a future conflict with China.

China's military is also increasingly investing in power projection platforms like aircraft carriers, long-range bombers, and larger fleets of blue-water surface combatants and submarines to accompany the aircraft carriers. As Chinese basing infrastructure expands into areas far from Chinese shores, the possibility of the Chinese military threatening U.S. forces and interests far outside East Asia is rising.

China is actively modernizing and expanding its nuclear forces and stands on the precipice of achieving a mature nuclear triad that can strike CONUS from the land, sea, and air.[6] This burgeoning Chinese strategic nuclear triad—comprising a growing multiple independent reentry vehicle (MIRV) capable ICBM force, an increasing number of SSBNs with longer-range SLBMs, and the in-development H-20 strategic stealth bomber—represents more and more a near-peer nuclear capability.

All of these new kinetic capabilities are buttressed by the PLA's pursuit of the ability to carry out "informationized warfare." China has invested heavily in the terrestrial- and space-based Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems necessary to collect and transmit better and more secure data for its military forces. The PLA has also invested in a variety of measures designed to

5 Harry Kazianis, "Behind the China Missile Hype," *The Diplomat*, January 20, 2012, available at https://thediplomat.com/2012/01/behind-the-china-missile-hype/.

6 Eric Heginbotham et al., *China's Evolving Nuclear Deterrent: Major Drivers and Issues for the United States* (Santa Monica, CA: RAND Corporation, 2017), p. 4; and Office of the Secretary of Defense (OSD), *Military and Security Developments Involving the People's Republic of China 2018*, Annual Report to Congress (Washington, DC: DoD, May 16, 2018), p. 78.

deny adversary use of information, predominantly in the electromagnetic spectrum (EMS) and the space and cyber domains. These range from hard- and soft-kill counterspace assets like jammers, micro-satellites, and directed-energy weapons, which could be placed in orbit and on land.[7] These systems pose a significant threat to the U.S. ability to wage war; U.S. forces who lose access to general data transmission or GPS during a conflict but have not fought without these assets before are unlikely to achieve operational success, perhaps even resulting in decision-making paralysis.

Questionable Strategic and Operational Assumptions

Since the end of the Cold War, the strategic community in the United States has taken a quarter-century respite from thinking seriously about great power competition and conflict, being consumed instead with a collection of small states or irregular adversaries who could not contest U.S. supremacy in any domain of warfare. The need to win the wars we were already fighting took precedence over the responsibility to prepare for the wars we might have to fight in the future. This led to the Department of Defense (DoD) de-emphasizing high-end assets, such as when Secretary of Defense Robert Gates shut down production of the F-22 fighter jet prematurely in order to free up funds for the War on Terror, assuming that the U.S. possessed a large enough technological edge over any potential adversary that it could afford to turn its attention elsewhere.[8]

Such assumptions have not stood the test of time. In the face of the rise of China and Russian aggression, a number of U.S. strategic assumptions are questionable at best, to include:

- The United States will face one adversary at a time;
- The U.S. homeland will be a sanctuary from adversary attack;
- The United States will have assured access to critical facilities and locations on allied and partner territory;
- A conflict with China would be a local war confined to a portion of the Western Pacific;
- A conflict with China would necessarily be short; and
- A war with China would have a clear beginning and end.

7 Kevin L. Pollpeter, Michael S. Chase, and Eric Heginbotham, *The Creation of the PLA Strategic Support Force and Its Implications for Chinese Military Space Operations* (Santa Monica, CA: RAND Corporation, 2017), p. 7; and Harsh Vasani, "How China Is Weaponizing Outer Space," *The Diplomat*, January 19, 2017, available at https://thediplomat.com/2017/01/how-china-is-weaponizing-outer-space/.

8 Mark A. Gunzinger, *Sizing and Shaping America's Military: Toward a New Force Planning Construct* (Washington, DC: Center for Strategic and Budgetary Assessments, 2013); Mark Gunzinger, Bryan Clark, David Johnson, and Jesse Sloman, *Force Planning for The Era of Great Power Competition* (Washington, DC: Center for Strategic and Budgetary Assessments, 2017); and Robert Gates, "Remarks by Secretary Gates to the Economic Club of Chicago," speech, July 16, 2009, available at http://archive.defense.gov/Speeches/Speech.aspx?SpeechID=1369.

Several U.S. operational assumptions are similarly either invalid or at risk of becoming so, to include:

- The United States and its allies will be able to achieve air superiority operating from land and sea bases;
- The United States will enjoy an operational sanctuary in space;
- U.S. information networks will remain secure; and
- The United States will be able to resupply its forces in the event of a high-intensity war.

The Need for Innovative Operational Concepts to Meet Emerging Challenges

To achieve and maintain a favorable military balance for the United States and its allies against China in the Indo-Pacific region and Russia in Europe, the 2018 National Defense Strategy Commission recommended that the DoD focus its investments on dealing with the following operational challenges:

- Protecting critical bases of operations, including the U.S. homeland, forces abroad, and allies and partners;
- Rapidly reinforcing and sustaining forces engaged forward;
- Assuring information systems in the face of attack and conducting effective information operations;
- Projecting and sustaining U.S. forces in distant anti-access or area-denial environments and defeating anti-access and area-denial threats;
- Deterring and, if necessary, defeating the use of nuclear or other strategic weapons in ways that would fall short of justifying a large-scale nuclear response;
- Enhancing the capability and survivability of space systems and supporting infrastructure; and
- Leveraging information technology and innovative concepts to develop an interoperable, joint C4ISR architecture and capability that supports warfare of the future.[9]

Developing innovative operational concepts and fielding new organizations and capabilities to overcome these challenges should become the urgent focus of DoD investment. In an era of constrained resources, those concepts and capabilities that offer the greatest strategic and operational leverage should receive preferential funding over those that do not.

9 National Defense Strategy Commission, *Providing for the Common Defense*, p. 15.

The Office of the Secretary of Defense and the Joint Staff should lead the development of joint operational concepts. These should include both efforts to use existing capabilities in new and innovative ways as well as ones to craft roles for truly new capabilities.

To evaluate candidate concepts and capabilities, the Defense Department should adopt a set of criteria for the innovative concepts and capabilities that it develops, including:

- Options: New concepts and capabilities should yield an expanded set of options for the United States and its allies, and they should constrain the options available to competitors such as China.
- Cost Imposition: New concepts and capabilities should put the United States and its allies on the right side of the cost equation. They should allow us to impose costs on competitors such as China while preventing our competitors from imposing costs on us.
- Initiative: New concepts and capabilities should give us initiative in the military competition with great powers such as China, forcing them to respond to us.

Congress has historically played an important role in promoting innovation, such as its advocacy of unmanned systems over the years. Today as well, Congress can spark the development of innovative operational concepts by requiring and funding experiments and demonstrations, as well as by demanding realistic assessments of them.

Potential innovative programs where the DoD can begin these experiments include:

Neutralizing Anti-Access/Area-Denial Threats through Long-Range, Multi-Dimensional Strike. Projecting and sustaining U.S. forces in the face of such A2/AD threats should be a major thrust of experimentation. Several subordinate efforts appear particularly promising.

First, the U.S. government purchased two stealthy X-47B unmanned aerial system (UAS) technology demonstrator aircraft before terminating the program. The Defense Department could use the aircraft to develop innovative concepts of operations for stealthy land- and sea-based unmanned systems, to include the value of autonomy as well as the use of innovative logistical concepts to extend their range.

Second, the Navy is procuring three DDG-1000 *Zumwalt*-class surface vessels. The attributes of these ships, to include their stealth, large displacement, and electric propulsion, make them both unique as surface combatants as well as potentially valuable assets for experimentation. The Defense Department could use the ships to develop concepts of operations for operating within range of an adversary's A2/AD capabilities. Specifically, they could be used to determine the value of stealthy surface combatants for conducting anti-air, anti-surface, and strike warfare in denied environments.

Third, the Defense Department is currently procuring a new Long-Range Anti-Ship Missile (LRASM), which should provide a highly capable weapon against enemy ships. However,

current plans call for the missile to be carried by three aircraft, the B-1B, the F/A-18E/F, and F-35. These aircraft will be increasingly challenged to operate in the Western Pacific due to growing threats to aircraft, tankers, and bases in that region. Accordingly, DoD should develop concepts to integrate LRASM onto the B-2 stealth bomber, which has the range and survivability that may be needed to reach Chinese or Russian target sets in defended waters. Should the concept prove successful, LRASM could subsequently be integrated onto the forthcoming B-21 bomber, which should be available in greater numbers than the B-2 for missions such as maritime strike.

Creating Anti-Access/Area-Denial Challenges for Competitors. Each of the Services is developing capabilities that could be used to create anti-access challenges for competitors. The Army and Marine Corps are both exploring the deployment of land-based anti-ship missiles such as LRASM, the Naval Strike Missile, and the Maritime Strike Tomahawk; the Navy is modernizing its anti-ship and land-attack capabilities; and, as described above, the Air Force plans to equip some of its aircraft with anti-ship missiles. Deployed in the First and Second Island Chains, such capabilities could reassure allies and deter China from committing aggression. Further experiments and demonstrations could yield innovative operational concepts for linking U.S. and allied forward-based and expeditionary land-based precision strike systems with sea-based munitions and tactical aircraft. Such experiments could yield new concepts for projecting and sustaining forces in A2/AD environments as well as reinforcing and sustaining forward engaged forces.

Protecting Critical Bases of Operations Against Salvo Attacks. As Protecting critical bases of operations against such salvo attacks is a key operational challenge. As CSBA has previously suggested, the United States should develop innovative operational concepts for defending those bases. Such defenses could include medium-range high-energy lasers (HEL), high-power microwave (HPM) systems, guided projectiles launched by rapid-firing guns, and low-cost surface-to-air missiles. Unmanned and manned aircraft carrying extended-range air-to-air missiles and equipped with wide-area surveillance sensors, HELs, and possibly HPM systems could further extend the range and increase the threat engagement capacity of a base salvo defense complex.[10]

Establishing Survivable C4ISR Networks. The Defense Department should develop innovative operational concepts and business practices to allow it to rapidly develop new space capabilities and launch them on relatively short notice. Such an approach could include not just the development of innovative practices, but also relationships with civilian space industry. It should also explore alternatives to space for services such as communications, ISR, and positioning, navigation, and timing (PNT). For example, the Defense Department should experiment with the use of UAS to provide communications, ISR, and PNT in a space-denied environment. Indeed, UAS may be able to provide these capabilities at much lower cost than

10 Mark Gunzinger and Carl Rehberg, *Air and Missile Defense at a Crossroads: New Concepts and Technologies to Defend America's Overseas Bases* (Washington, DC: Center for Strategic and Budgetary Assessments, 2018).

launching new satellites. Such initiatives would yield insight into the concepts and technologies needed to enhance the capability and survivability of space systems and the services they provide, as well as new ways to leverage interoperable joint C4ISR in the face of adversary threats.

In each of the above cases, relatively modest investments of money coupled with systems that have already been procured (e.g., the X-47B and DDG-1000) or are already being procured (e.g., LRASM, Naval Strike Missile) could reap disproportionate rewards. Success will, however, require a tolerance for risk and failure as well as a desire to break out of a bureaucratic mindset that prizes slow, methodical research, development, and acquisition over rapid capability development.

The development of new concepts and the conclusion of experiments are not ends in and of themselves. Too often, DoD experiments have been side projects; they create a façade of innovation without actually making any substantial impact. As a result, the forces and capabilities we have today—and are currently procuring—are out of alignment with the world of 2020 and beyond. The objective of concept development and experimentation must be to inform major shifts in investment and force structure toward the forces and capabilities that can bring the U.S. military back into alignment with the operational challenges it faces.

CHAPTER 1

Introduction

A soldier . . . in peacetime is like a sailor navigating by dead reckoning. You have left the terra firma of the last war and are extrapolating from the experiences of that war. The greater the distance from the last war, the greater become the chances of error in this extrapolation. Occasionally there is a break in the clouds: a small-scale conflict occurs somewhere and gives you a "fix" by showing whether certain weapons and techniques are effective or not; but it is a doubtful fix. . . . For the most part you have to sail on in a fog of peace until the last moment. Then, probably when it is too late, the clouds lift and there is land immediately ahead; breakers, probably, and rocks. Then you find out rather late in the day whether your calculations have been right or not.

—Sir Michael Howard[11]

The 2018 *National Defense Strategy* (NDS) refocused U.S. defense planning on the reality of competition and the possibility of conflict with China and Russia.[12] The report of the Congressionally-mandated National Defense Strategy Commission endorsed this focus, but also emphasized the urgent need to address eroding military balances and growing operational challenges through the development of innovative operational concepts. Absent drastic change, the Commission argued that "the U.S. military could lose the next state-versus-state war it fights."[13]

Resources are clearly required for the Defense Department to increase readiness to meet near-term challenges while modernizing for competition and conflict in the 21st century. However, bigger budgets will likely prove insufficient to support the national defense strategy at a low level of risk. As a result, there is a pressing need to develop innovative operational concepts to bridge the gap between our ends and our means. This paper is meant to stimulate discussion

11 Michael Howard, "Military Science in an Age of Peace," *Journal of the Royal United Services Institute for Defence Studies* 119, no. 1, March 1974, p. 4.

12 DoD, *Summary of the 2018 National Defense Strategy of the United States of America* (2018), p. 2.

13 National Defense Strategy Commission, *Providing for the Common Defense*), p. 10.

of, and ultimately spur action to develop, the concepts and capabilities the United States will need to prevail in a more dangerous world.

This monograph examines the challenge of planning for an era characterized by the reality of great power competition and the possibility of great power conflict, with a focus on China. Specifically, it explores how changes in the security environment can render obsolete the once-foundational strategic assumptions that shaped force development and operational planning. It also discusses the vital role that operational challenges play in driving the development of innovative operational concepts, organizations, and capabilities. It does this by examining how the United States responded to such a situation during a previous period of great power competition: the rivalry with Imperial Japan in the years separating the two world wars. Then, as now, the United States faced a rising power with expanding political horizons that threatened American interests in the Asia-Pacific region during a period of technological and doctrinal change. It then assesses how Chinese military modernization is undermining a series of strategic and operational assumptions that have undergirded U.S. force planning for years. It then discusses the operational challenges that should drive force development before describing some of the innovative concepts and capabilities that may be needed for the United States to succeed in an era of great power competition.

CHAPTER 2

Planning for Great Power Competition: The Interwar Period

As the United States finds itself in a period of great power competition and facing the prospect of great power war, it is helpful to look to the past for insights that can illuminate the future. This is, after all, not the first time the United States has faced a major power rival. From its birth to the early 20th century, the United States and Great Britain were strategic rivals, even if their rivalry ended amicably.[14] In the early decades of the last century, the United States and Japan competed for influence in Asia and the Pacific. And, of course, the United States and the Soviet Union struggled to shape the global order during the four-decade-long Cold War.[15]

There is a natural tendency to mine the Cold War for lessons to inform the United States today. There is also, however, much to be learned by studying the competition between the United States and Imperial Japan in the years that spanned the two world wars. First, Japan was a rising power with growing horizons and expanding political objectives, much as China is today. Second, the geographic setting of the competition between the United States and Japan—the Western Pacific—overlaps considerably with that of the Sino-American competition. Third, the U.S.-Japan rivalry coincided with a period of technological change much like

14 Kori Schake, *Safe Passage: The Transition from British to American Hegemony* (Cambridge, MA: Harvard University Press, 2017); John Gooch, "The Weary Titan: Strategy and Policy in Great Britain, 1890–1918," in Williamson Murray, MacGregor Knox, and Alvin Bernstein, eds., *The Making of Strategy: Rulers, States, and War* (New York: Cambridge University Press, 1994), pp. 289–290; Kenneth Bourne, *Britain and the Balance of Power in North America, 1815–1908* (Berkeley, CA: University of California Press, 1967); and Bradford Perkins, *The Great Rapprochement: England and the United States, 1895–1914* (New York: Charles Scribner and Sons, 1967).

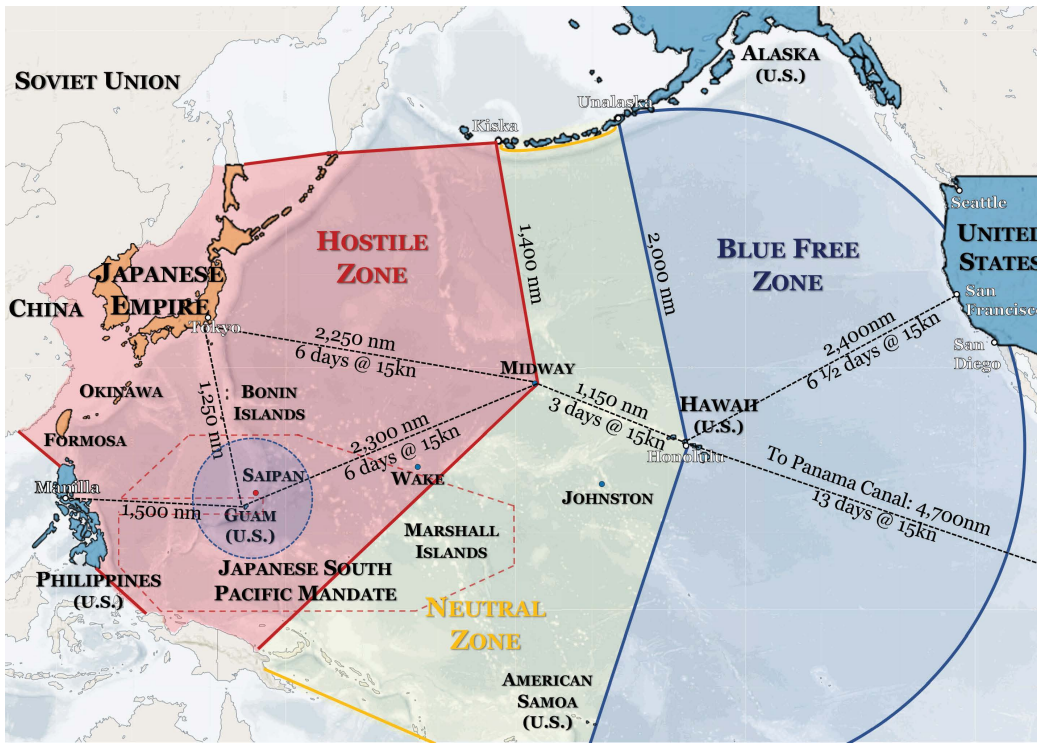
15 See, for example, James Lacey, ed., *Great Strategic Rivalries from the Classical World to the Cold War* (Oxford: Oxford University Press, 2016), chapters 11, 15, and 16.

that we are experiencing today. Today, as in the past, militaries that innovate are likely to be at an advantage over those that fail to do so.[16]

During the years that separated the two world wars, the growth of Japanese military power and the emergence of new technology, combined with the unchanging reality of geography, called into question the assumptions upon which the United States had previously based its force development and operational planning. In response, the United States developed innovative operational concepts and capabilities that later proved crucial to Allied victory during the Pacific War.

Then, as now, the United States faced the need to defend geographically distant territory and interests from a more proximate adversary (see Figure 1). The U.S. Navy's fleet base in San Diego is 6,400 nm from the Philippines and 4,800 nm to Tokyo. Even when forward deployed to Pearl Harbor, the U.S. Fleet was 3,350 nm from Japan. By contrast, Tokyo is only 1,600 nm from Manila.

FIGURE 1: THE STRATEGIC GEOGRAPHY OF THE WESTERN PACIFIC



The interwar period also witnessed considerable technological and doctrinal change. The first two decades of the 20th century saw the advent of the *Dreadnought* and the emergence of air power and armored warfare. In the two decades that followed, militaries across the globe faced

16 For more on Japanese grand strategy, see footnote 2.

the challenge of how to develop new ways of war, including concepts of armored warfare, strategic bombing, close air support, carrier aviation, amphibious warfare, and radio and radar.[17]

A conflict with Japan was the U.S. Navy's top planning contingency throughout the interwar period because only the Japanese fleet was strong enough to threaten U.S. interests in Asia: first and foremost the Philippines, then an American territory, as well as U.S. island possessions in the Western Pacific.[18] Beginning in 1897, the Army and Navy developed a series of plans for a war with Japan known as War Plan ORANGE.[19] In 1923, the Joint Army-Navy Board, comprising the Army Chief of Staff, the Chief of Naval Operations, their deputies, and their chief planners, identified a war with Japan as the most pressing contingency facing the United States, a judgment it reaffirmed five years later.[20]

War Plan ORANGE envisioned a limited war between the United States and Japan in the Western Pacific. Army and Navy planners assumed that neither side would have allies. They further believed that such a war would be confined to the Pacific, with the decisive action occurring in the waters of the Western Pacific.

Geography dictated that sea power would dominate any war between Japan and the United States. The length of the sea lines of communications in the Pacific meant that the side operating near its home waters would enjoy a considerable advantage. Although the expanse of the Pacific would render a Japanese attempt to seize Hawaii or attack the west coast of the United States untenable, it would also complicate American efforts to cross the Pacific. The award of Germany's territories in the Marshall, Caroline, and Mariana Islands to Japan after World War I compounded the difficulty of the task. Japan thus enjoyed a significant geographic advantage in the Central and Western Pacific. In the words of the United States Joint Army and Navy Board,

> The position of Japan is such as to form a continuous strategic barrier of great strength covering almost the entire coast of Eastern Siberia and of China, while the position of its Mandate forms a barrier of considerable depth between the United States and the Philippines. The geographic

17 See, for example, Williamson Murray and Allan R. Millett, eds., *Military Innovation in the Interwar Period* (New York: Cambridge University Press, 1996); and Thomas G. Mahnken, *Uncovering Ways of War: U.S. Military Intelligence and Foreign Military Innovation, 1918–1941* (Ithaca: Cornell University Press, 2002).

18 This section draws upon Thomas G. Mahnken, "U.S. Grand Strategy, 1939–1945," in John Ferris and Evan Mawdsley, eds., *The Cambridge History of The Second World War*, volume I, *Fighting the War* (New York: Cambridge University Press, 2015).

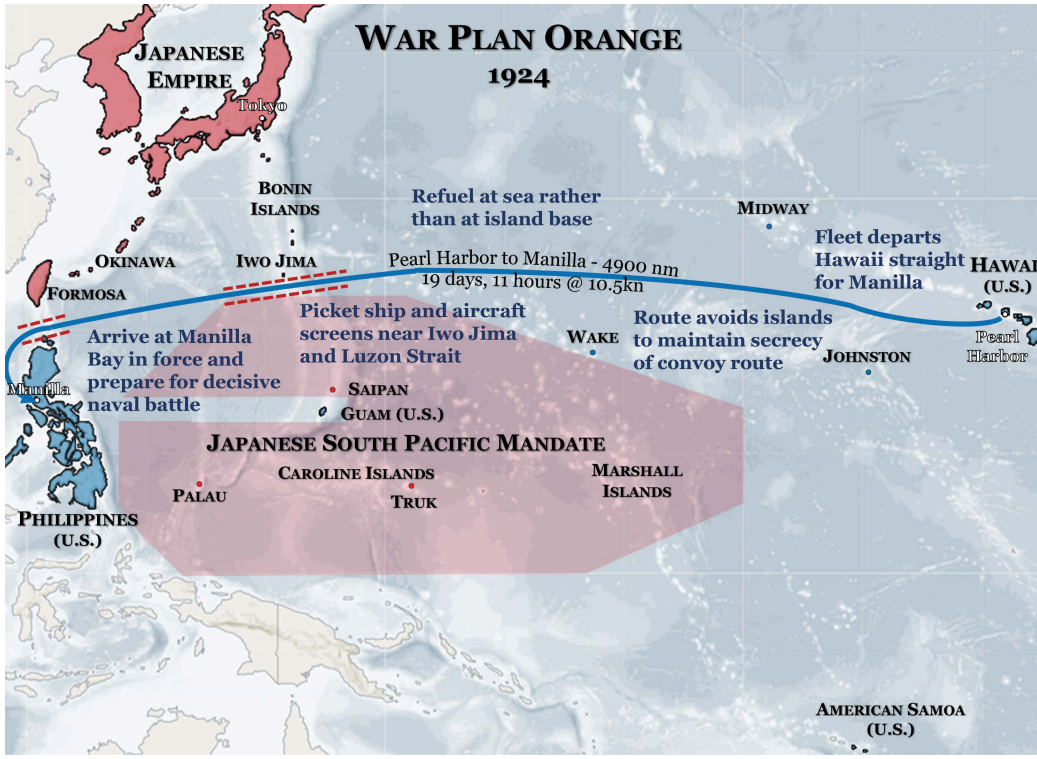
19 Edward S. Miller, *War Plan ORANGE: The U.S. Strategy to Defeat Japan, 1897–1945* (Annapolis, MD: Naval Institute Press, 1991); and Louis Morton, "War Plan ORANGE: Evolution of a Strategy," *World Politics* 11, no. 2, January 1959.

20 Joint Board to Secretary of War, "Coordination of Army and Navy War Plans," June 7, 1923, JB325, Ser 210, Records of the Joint Board, Roll 9, Record Group 225, National Archives (hereafter referred to as NA), p. 1; Joint Planning Committee to Joint Board, "Order of Priority in Preparation of War Plans," April 21, 1928, Records of the Joint Board, Roll 9, RG 225, p. 1.

> strength of Japan is its interior position as regards to its outlying possessions, its interior position with regards to Eastern Asia, and its insularity.[21]

In its original form, War Plan ORANGE envisioned the U.S. Navy conducting a rapid trans-Pacific naval lunge to defend U.S. possessions, primarily the Philippines, against Japanese aggression (see Figure 2). The plan envisioned the Navy defeating Japan by "isolation and harassment," the disruption of its sea lines of communication, and "offensive sea and air operations against her naval forces and economic life." If these measures were insufficient, then planners ambiguously called for the United States to take "such further actions as may be required to win the war."[22]

FIGURE 2: WAR PLAN ORANGE, 1924



The early versions of War Plan ORANGE were written in an era when naval warfare was synonymous with a clash between opposing fleets led by battleships; when land-based and naval aircraft had limited speed, payload, and endurance; and when submarines possessed limited underwater endurance. Furthermore, the 1922 Washington Naval Treaties limited the tonnage the United States, Great Britain, and Japan, among others, could allocate to their

21 Joint Board to Secretary of the Navy, Blue-Orange Joint Estimate of the Situation, January 11, 1929, JB 325, Ser 280, Joint Board Records, Record Group (RG) 225, NA, 5.

22 Joint Army-Navy Basic War Plan ORANGE, 1924, Joint Board (JB) 325, Ser. 228.

battle fleets.[23] These tonnage limits were designed to grant Japan a large enough battle fleet to be able to defend itself, but not enough to wage a war of conquest. The treaties further prohibited the signatories from constructing any new fortifications or naval bases in the Pacific. This was a significant victory for Japan, as overcoming those fortifications would have posed an obstacle to Japanese expansion.

In response to the limitations imposed upon Japan, the Imperial Japanese Navy (IJN) sought to develop innovative doctrine to offset the U.S. Navy's quantitative edge.[24] The IJN formulated a strategy of "interception-attrition operations" (*yogeki zengen sakusen*) to wear down the American battle fleet before annihilating it in a decisive battle. At the outset of hostilities, the Japanese navy would destroy the U.S. Asiatic Fleet and occupy the Philippine Islands and Guam. It would then sortie submarines into the Eastern Pacific to monitor the movements of the relief force and harass it on its voyage westward to recover the American possessions. Naval aircraft based in the Marshall, Caroline, and Mariana Islands would join the battle as soon as U.S. ships steamed into range. When the Japanese fleet had reduced the Americans to parity or less, it would seek a decisive battle near Japanese home waters. An advance body of cruisers and destroyers supported by fast battleships would conduct a night attack using salvos of long-range torpedoes to weaken and confuse the enemy. At daybreak, the Japanese commander would throw the full weight of his battle line against the American fleet in a bid to annihilate it.[25]

The Japanese navy sought to improve the quality of its fighting forces to offset the U.S. Navy's quantitative superiority. For example, it developed a unique tactical system emphasizing long-range gunnery, torpedo firing, and night operations in an effort to level the tactical playing field with the larger U.S. Navy. It also secretly developed and deployed the Type 93 oxygen-propelled torpedo, also known as the Long Lance, a weapon with a larger warhead, greater speed, and longer range than contemporary American and British models.[26]

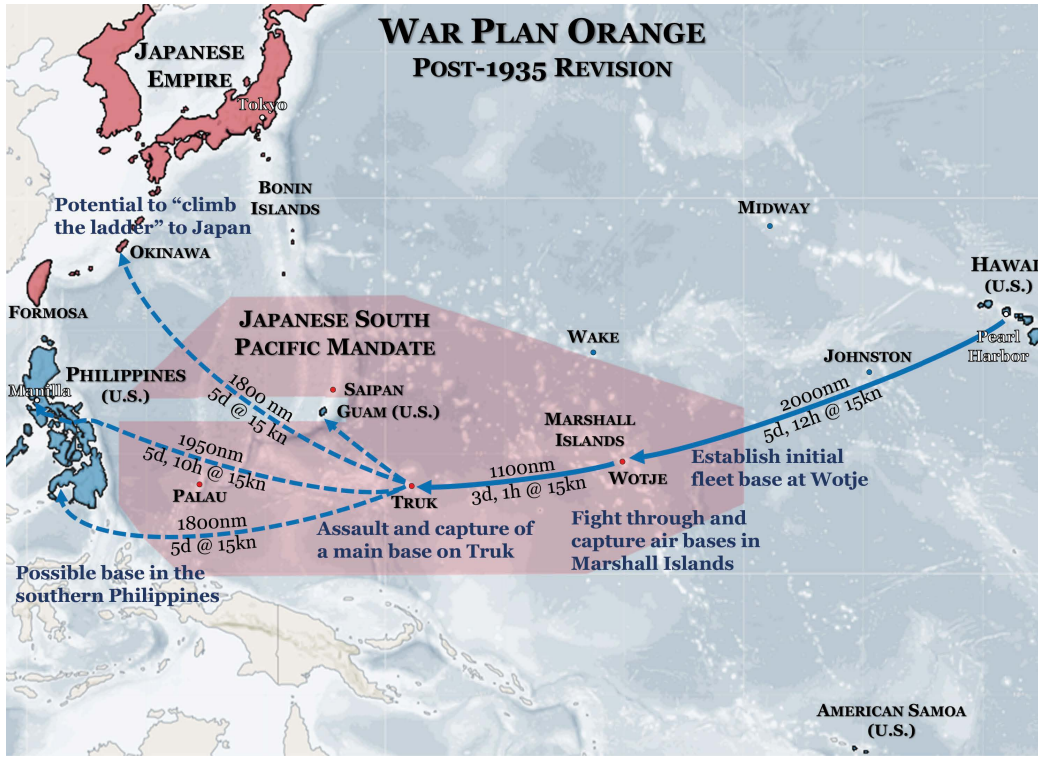
23 The treaty limited the United States to eighteen battleships and battle cruisers totaling 525,000 tons and allowed Japan ten battleships and battle cruisers totaling 315,000 tons. It forbade the construction of capital ships displacing more than 35,000 tons and mounting guns in excess of 16 inches. It allowed the United States to possess carriers totaling 135,000 tons and Japan 81,000 tons and to convert two ships displacing 33,000 tons or less to carriers. While the agreement did not constrain overall cruiser tonnage, it limited their displacement to 10,000 tons and main armament to 8-inch guns. Harold and Margaret Sprout, *Toward a New Order of Sea Power: American Naval Power and the World Scene, 1918–1922* (New York: Greenwood Press, 1969), pp. 302–311.

24 See, for example, David C. Evans and Mark R. Peattie, *Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887–1941* (Annapolis, MD: Naval Institute Press, 1997); and Paul S. Dull, *A Battle History of the Imperial Japanese Navy, 1941–1945* (Annapolis, MD: Naval Institute Press, 1978).

25 Yoichi Hirama, "Japanese Naval Preparations for World War II," *Naval War College Review* 44, no. 2, Spring 1991, p. 64.

26 Thomas G. Mahnken, "Asymmetric Warfare at Sea: The Naval Battles off Guadalcanal, 1942–1943," *Naval War College Review* 64, no. 1, Winter 2011.

FIGURE 3: WAR PLAN ORANGE, POST-1935 REVISION



The shifting military balance in the Western Pacific caused the Army and Navy to reconsider the assumptions that undergirded U.S. planning. As early as 1928, war games at the Naval War College in Newport, RI, showed the balance in a war between the United States and Japan shifting in Tokyo's favor.[27] Over time, the growth of Japanese naval power forced the Navy to modify its plans: whereas Navy planners originally envisioned a rapid trans-Pacific lunge as the best way to relieve the Philippines, planning shifted to a protracted, sequential campaign to recover the islands that, it was assumed, would fall to the Japanese before help could arrive (see Figure 3). In one of the great ironies of history, the 1935 version of the plan, which consigned the Philippines to its fate, was prepared during the tenure of Douglas MacArthur as Army Chief of Staff. Seven years later, MacArthur would live out the consequences of that shift when the Philippines fell to a Japanese invasion without relief from the U.S. armed forces.

The operational challenge posed by the need to cross the Pacific, establishing support bases along the way, in order to recover U.S. territories in the Western Pacific and then defeat

27 Michael Vlahos, "War Gaming, An Enforcer of Strategic Realism," *Naval War College Review*, March–April 1986, pp. 10, 13.

Japan, promoted innovation in the Navy and Marine Corps during the interwar period.[28] First, it helped drive the Navy to develop carrier air power as a way to project power across the vast expanse of the Pacific. The need to operate in the environmental conditions of the Pacific shaped the design of American aircraft carriers. The requirements of a campaign against Japan, as played out on the game floor of the U.S. Naval War College, also led to operational concepts that emphasized the independent, offensive use of carrier aviation. Second, the need to supply naval forces during a protracted trans-Pacific campaign led to the development of expeditionary logistics. Beginning in 1924, the Navy's annual fleet exercises examined various underway replenishment methods to learn more about the conditions under which they could be performed.[29] The Navy also explored the possibility of creating a series of floating base facilities that would operate out of austere harbors to support naval operations.[30] Third, the challenge of a war with Japan also motivated the Marine Corps to develop amphibious warfare concepts to seize and hold island bases that would be needed to support a trans-Pacific campaign.

Despite driving force structure and operational concept development, War Plan ORANGE, a contingency premised on the assumptions of a war fought by two belligerents in a single theater of operations, was a far cry from the strategic situation that the United States would face in World War II: a coalition war fought simultaneously across multiple theaters. Closer to reality was Joint Plan RED-ORANGE, which envisioned the United States waging a two-theater war against an alliance of Japan and Great Britain. Planners viewed this contingency as a grave threat to American security, one that would require full-scale mobilization and total military effort. Whereas the central feature of a war with Japan would be a naval campaign in the Pacific, RED-ORANGE required planners to contemplate a two-ocean war against two great naval powers. The strategic options open to the United States in such circumstances were limited to either assuming a defensive posture on both fronts or taking the offensive in one theater while standing on the defensive in the other. Given these options, as well as the assumption that Great Britain would pose the greater threat, planners recommended a focus on obtaining a favorable decision in the Atlantic while remaining on the defensive in the Pacific.[31]

28 See, for example, Murray and Millett, *Military Innovation in the Interwar*, chapters 2, 5, and 6; William M. McBride, *Technological Change and the United States Navy, 1895–1945* (Baltimore, MD: Johns Hopkins University Press, 2000); Jan M. van Tol, "Military Innovation and Carrier Aviation: the Relevant History," *Joint Force Quarterly*, Summer 1997, pp. 77–87; and Thomas Wildenberg, *All the Factors of Victory: ADM Joseph Mason Reeves and the Origins of Carrier Airpower* (Dulles, VA: Brassey's, 2003).

29 Albert Nofi, *To Train the Fleet for War: The U.S. Navy Fleet Problems, 1923–1940* (Newport, RI: Naval War College Press, 2010), p. 61.

30 Miller, *War Plan ORANGE*, pp. 147–148.

31 William R. Braisted, "On the American Red and Red-Orange Plans, 1919-1939," in Gerald Jordan, ed., *Naval Warfare in the Twentieth Century, 1900-1945* (London: Croom Helm, 1977); and Thaddeus Holt, "Joint Plan Red," *Military History Quarterly* 1, no. 1, Autumn 1988.

The idea that the United States would face an Anglo-Japanese alliance was politically dubious, a fact that planners at the time readily acknowledged. Yet as a strategic planning exercise, War Plan RED-ORANGE forced the Army and Navy to confront the problems the United States would face in a two-ocean war, an experience that was useful in thinking through the strategic circumstances the United States would confront after the outbreak of World War II.

Not surprisingly, given the experience of World War I, the War and Navy Departments also paid considerable attention to industrial mobilization. In 1924, the War Department established the Army Industrial College (later the Industrial College of the Armed Forces and now National Defense University's Eisenhower School) to focus on wartime procurement and mobilization procedures. These preparations had a considerable influence on America's ability to wage a multi-theater industrial war.

As fascist power grew in Europe throughout the second half of the 1930s, the strategic and operational assumptions upon which U.S. defense planning had been based became increasingly questionable. First, planners began to reconsider the assumption that the U.S. homeland would be secure in a future war. German and Italian expansion in Europe, and the emergence of sympathetic fascist movements in Central and South America, raised the possibility that Germany or Italy could gain a foothold in the Western Hemisphere in violation of the Monroe Doctrine. These geopolitical developments, combined with the existence of long-range bombers and increasingly capable fleet submarines, raised the possibility that an adversary would be able to attack the U.S. homeland. Second, the rise of fascism in Europe called into question the assumption that a future war would be confined to the Pacific. Rather, the Army and Navy were confronted with the need to plan for a two-theater war. Third, German and Italian aggression in Europe and Japanese campaigns in Asia opened the door to the possibility that the United States would not fight alone, but rather as part of a coalition.

In 1939, the Joint Planning Board thus began drafting a new series of war plans, dubbed RAINBOW, for a multi-theater coalition war. The most limited plan, RAINBOW 1, envisioned a defensive campaign to protect the United States and the Western Hemisphere north of 10 degrees south latitude in which the United States was assumed to be acting alone. RAINBOW 2 assumed that the United States would be allied with France and Britain and that it would focus its efforts on the Pacific. RAINBOW 3 was essentially a recapitulation of Plan ORANGE, with the addition of the need to protect the Western Hemisphere. RAINBOW 4 was similar to RAINBOW 1 but also assumed the United States would defend the entire Western Hemisphere.

In January 1941, amid a darkening international situation, the United States entered secret staff talks with British and Canadian military representatives in Washington, DC to outline a combined strategy for the war. The result of the talks, ABC-1, became the fundamental statement of Anglo-American strategy. It established the principle that defeating Germany first should be the primary aim of the Allies.

Following the conference, the U.S. Army-Navy Joint Board recommended the development of a plan for war with Germany, Italy, and Japan. The result was War Plan RAINBOW 5, which was completed in April 1941. Like ABC-1, it affirmed a Germany-first strategy. It envisioned the application of economic pressure, a sustained air offensive, and a series of raids and minor offensives to capture positions around the periphery of Europe in preparation for an offensive against Germany. It also reflected the American commitment to a single thrust against Germany, envisioning the primary immediate effort of the U.S. Army to be "the building up of a large land and air force for major offensive operations against the Axis powers." It called for the United States to "project the armed forces of the United States to the Eastern Atlantic and to either or both of the African or European Continents, as rapidly as possible consistent with [hemispheric defense] in order to effect the decisive defeat of Germany, or Italy, or both."[32] RAINBOW 5 became the basic U.S. plan for World War II.

World War II thus broke in a number of cases from the planning assumptions held by the U.S. Army and Navy throughout much of the interwar period. Nonetheless, the experience of planning for a war with Japan served the United States well. In particular, the operational challenges posed by Japan in the Pacific served as an engine that drove the development of innovative operational concepts and capabilities such as carrier aviation, expeditionary logistics, and amphibious operations.

32 Quoted in Richard W. Steele, *The First Offensive, 1942: Roosevelt, Marshall and the Making of American Strategy* (Bloomington, IN: Indiana University Press, 1973), p. 24; and Maurice Matloff and Edwin M. Snell, *The War Department: Strategic Planning for Coalition War, 1941–1942* (Washington, DC: U.S. Army Center of Military History, 1999), p. 8.

CHAPTER 3

Emerging Threat Trends

The situation confronting the United States today in many ways resembles that of the interwar period: the combination of a rising competitor in the Western Pacific enjoying a strategic geographic advantage with the development of new ways of war. These developments call into question the basis of U.S. strategy, operational planning, and force development. This chapter explores emerging threat trends in detail, while Chapter 4 examines how they call into question long-standing strategic and operational assumptions.

During the Cold War, Europe was the most vital region for the United States strategically and the center of world economic gravity. Today that center of gravity is increasingly shifting to Asia, where China's growing economic, political, and military influence threaten to dominate the region and marginalize the United States. As such, the United States has taken steps over the last decade to increase its presence in Asia, such as the U.S. Marine Corps' rotational force based in the northern Australian city of Darwin, which has grown from 200 in 2012 to 1,500 in 2018.[33] The Defense Department has also emphasized building new strategic partnerships with Indo-Pacific countries such as Vietnam, strengthening alliances with long-standing allies like Japan and South Korea, and distributing U.S. power projection capabilities across different regions of the Indo-Pacific.

China's military continues to expand and develop rapidly, particularly in regards to theater strike capabilities, and it is uncertain how successful existing U.S. initiatives will be in shoring up eroding areas of U.S. military superiority. If U.S. allies and partners perceive the U.S.-China military balance tilting in an unfavorable direction, it could prompt them to question the benefits of standing with the United States. They might assess that continuing an alliance with the United States risks provoking a Chinese retaliation. Thus, a military balance tilting

33 Marine Rotational Force, Darwin, "Marines Land Down Under for MRF-D 2018," news, U.S. Marine Forces, Pacific, April 27, 2018, available at https://www.marforpac.marines.mil/News/News-Article-Display/Article/1506069/marines-land-down-under-for-mrf-d-2018/.

toward China could upend alliance relationships the United States depends on for access to and power projection in these regions.

The United States relies on its carrier air wings, theater strike aircraft, long-range bombers, and Marine expeditionary forces to project military power across the Pacific. However, Beijing's maturing A2/AD capabilities challenge existing U.S. operational concepts in the Indo-Pacific region. The PLA's medium-range ballistic missiles (MRBM), air- and sea-launched land attack cruise missiles (LACM), modern long-range surface-to-air missiles (SAM), wide-area surveillance and targeting, advanced bombers, and 5th generation fighters all make up core components of a strategy designed to negate the U.S. advantage in power projection.

Strategic Geography and the Tyranny of Distance

Flanked by two oceans, the strategic geography of the United States affords it natural barriers against attack, requiring adversaries to cross the vast expanse of the Pacific Ocean to reach U.S. soil. Conversely, the immense distance between the United States and the European and Asian continents makes it difficult for the United States to project power across and beyond its two maritime boundaries as well as deploy military personnel, equipment, and resources to other parts of the world quickly, efficiently, and safely in the event of conflict.

To mitigate this time-distance problem, since the end of World War II the United States has relied on forward deployed forces and U.S. forward operating bases supported by a system of multilateral alliances in Europe and bilateral alliances in Asia. The distribution of U.S. forces abroad demonstrates the enduring strategic importance of both continents. Japan and South Korea host the largest number of U.S. troops in the world after Germany, with 54,000 in Japan and 28,500 in South Korea.[34] These forward forces are backed by highly capable power projection forces designed to deploy rapidly from the continental United States and deliver a decisive blow to an adversary. These power projection forces serve as the foundation of U.S. deterrence and reassurance in Asia and the Western Pacific.[35] Working with its allies and partners to forward position its military forces and equipment, the United States is "[prepared] to counter threats when and where they materialize rather than responding directly long after aggression has occurred or responding indirectly by imposing costs in other theaters."[36]

34 "About USFJ," U.S. Forces Japan, updated January 29, 2019, available at http://www.usfj.mil/About-USFJ/; and Adam Taylor, "How Long Should U.S. Troops Stay in Korea? Even After Reunification, South Korean Lawmakers Say," *Washington Post*, October 5, 2018, available at https://www.washingtonpost.com/world/2018/10/05/how-long-should-us-troops-stay-korea-even-after-reunification-south-korean-lawmakers-say/?utm_term=.395165123666.

35 Mahnken, "U.S. Strategy: Confronting Challenges Abroad and Constraints at Home."

36 Evan Braden Montgomery, *Reinforcing the Front Line: U.S. Defense Strategy and the Rise of China* (Washington, DC: Center for Strategic and Budgetary Assessments, 2017), p. ii.

FIGURE 4: MAP OF THE FIRST AND SECOND ISLAND CHAINS

Mark Gunzinger and Carl Rehberg, *Air and Missile Defense at a Crossroads: New Concepts and Technologies to Defend America's Overseas Bases* (Washington, DC: Center for Strategic and Budgetary Assessments, 2018), p. 4.

The so-called First and Second Island Chains figure prominently in the maritime geography of the Western Pacific.[37] The First Island Chain is comprised of the Aleutians, the Kurils, the Japanese archipelago, the Ryukyus, Taiwan, the Philippines, and Indonesia.[38] The Second Island Chain is made up of the Bonins, the Marianas, Guam, and the Palau group.[39] The First Island Chain is thus largely comprised of American allies, whereas the Second Island Chain includes American territory. Western observers of China perceive the island chains to be spatial indicators for China's "counter-invention" or "active defense" strategy. Official U.S. defense reports point to the First Island Chain as the geographic demarcation in which China seeks to establish air and maritime superiority, the regional focus of China's expanding A2/AD capabilities.[40] According to various Chinese sources, the island chains act as barriers that China must penetrate to freely maneuver in the broad Pacific Ocean areas, launching pads

37 Toshi Yoshihara, "Chinese Maritime Geography," in Thomas G. Mahnken and Dan Blumenthal, eds., *Strategy in Asia: The Past, Present, and Future of Regional Security* (Palo Alto, CA: Stanford University Press, 2014).

38 Alexander Chieh-cheng Huang, "The Chinese Navy's Offshore Active Defense Strategy," *Naval War College Review* 47, no. 3, Summer 1994, p. 18.

39 Ibid.

40 OSD, *Military and Security Developments Involving the People's Republic of China 2015*, Annual Report to Congress (Washington, DC: DoD, 2015).

that allow whoever controls them to project power, and benchmarks for the advancement of Chinese air and naval force projection capabilities.[41]

A conflict in the Western Pacific would depend heavily on the ability of the United States to deploy its military forces and equipment quickly, efficiently, and safely to reinforce threatened allies or forward U.S. forces. However, even if unimpeded by hostile forces, the distances between the continental United States (CONUS) to the Western Pacific are so vast that calling any reinforcements quick is a relative term, especially with naval assets. Even at its maximum speed of 30+ knots, a *Nimitz*-class aircraft carrier based in San Diego would take upward of a week to travel the 6,500 miles from San Diego to Yokosuka Naval Base in Japan, and the various ships in the carrier strike group would have to stop at a friendly port at least once for a lengthy refuel in between. By the time these CONUS-based forces arrive in theater, the decisive moment of the conflict may already have passed, and there may no longer be anywhere for U.S. forces to arrive efficiently or safely. To address future warfare challenges in the Asia-Pacific, the United States must find innovative solutions to this time-distance problem.

As Chinese military modernization continues, China may increasingly face a time-distance problem of its own. Whereas the United States must address the tyranny of distance, China's access to the open ocean is constrained by the First and Second Island Chains. Moreover, China is fielding a blue water navy as well as other means to project military power over great distances. For any naval force operating in the vast Pacific Ocean, the ability to stay at sea for longer periods of time farther from home ports is imperative. To the extent that the United States and its allies invest in A2/AD capabilities of their own, they will constrain China's ability to project and sustain its power at a distance from the Chinese homeland.

Chinese Economic Growth and Defense Spending

Economic growth and military power go hand-in-hand in China's national defense strategy. According to the 2008 Chinese defense white paper, the Chinese government is committed to "[striking] a balance between enriching the country and strengthening the military, so as to ensure that its strategy for national defense and armed forces building is compatible with its strategy for national development."[42] Sustained economic growth is the source of political power and social stability in China. As Evan Montgomery has noted, "Continued economic growth underpins the legitimacy of the Chinese Communist Party (CCP) and is central to President Xi Jinping's 'China Dream' of national prosperity and global influence."[43]

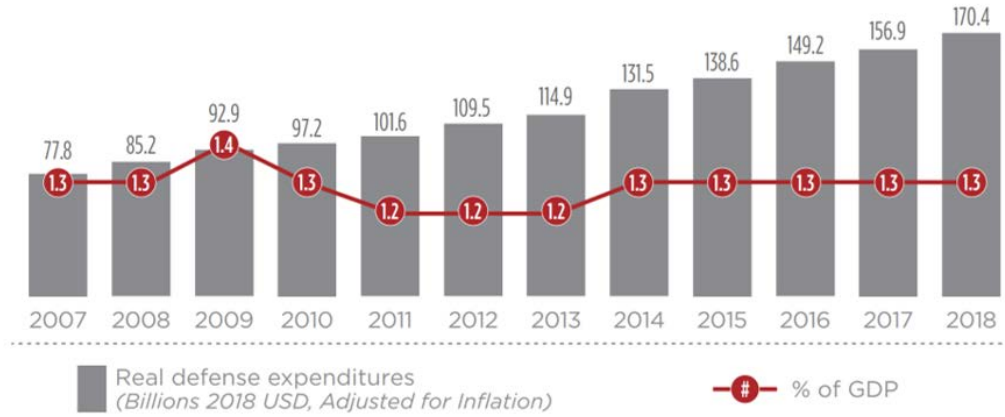
41 Andrew S. Erickson and Joel Wuthnow, "Barriers, Springboards and Benchmarks: China Conceptualizes the Pacific 'Island Chains'," *The China Quarterly*, January 2016, p. 2.

42 The State Council Information Office of the People's Republic of China, *China's National Defense in 2008* (Beijing: PRC, January 2009), available at http://eng.mod.gov.cn/publications/2017-04/11/content_4778231.htm.

43 Montgomery, *Reinforcing the Front Line*, p. 5.

China has experienced continuous economic growth over the past thirty years and has steadily increased its defense budget over the last twenty. Although there is considerable disagreement over the exact size of its military budget, China is the second largest military spender in the world after the United States. Although its annual GDP growth is no longer measured in double digits like it was in the early 2000s, China's economy continues to grow at a steady, albeit diminished, rate.[44] From 2008 to 2018, China's defense budget doubled, and it currently stands at between $150 billion and $228 billion.[45] Even this sizeable figure does not capture all actual defense spending due to the Chinese government's lack of transparency surrounding national security matters, especially military expenditures. It is also worth noting that China may be able to get more capability from the same amount of defense spending than the United States due to lower labor costs, highly centralized and thus quicker political decision-making regarding how to allocate finite resources, and the closely aligned priorities and timelines of state-owned enterprises and the Chinese government.

FIGURE 5: CHINA'S OFFICIAL DEFENSE BUDGET (2007–2018)



Defense Intelligence Agency (DIA), *China Military Power: Modernizing a Force to Fight and Win* (Washington, DC: DoD, January 15, 2019), p. 21.

Military Modernization

The core of Chinese modernization efforts lies in being able to fight and win "informatized local wars."[46] The PLA's mission consists of eight strategic tasks: safeguarding the sovereignty of China's territory; safeguarding national unification; safeguarding China's interests in new domains such as space and cyberspace; maintaining strategic deterrence; participating in

44 "GDP Growth (Annual %)," The World Bank: Data, updated as of December 3, 2018, available at https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=CN.

45 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, pp. 81–82; and "Global Military Spending Remains High at $1.7 Trillion," press release, Stockholm International Peace Research Institute (SIPRI), May 2, 2018, available at https://www.sipri.org/media/press-release/2018/global-military-spending-remains-high-17-trillion.

46 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. ii.

international security cooperation; maintaining China's political security and social stability; and conducting emergency rescue, disaster relief, and "rights and interest protection" missions.[47] To achieve its mission, PLA modernization has emphasized quality over quantity; the size of the PLA has decreased as it has fielded a growing number of modern weapon systems.[48] The PLA has also undergone major organizational, doctrinal, and force structure reforms to integrate combat forces that, according to the 2015 Chinese defense white paper, "will be employed to prevail in system-vs-system operations featuring information dominance, precision strikes and joint operations."[49]

China's conventional ground, air, and naval forces form the backbone of China's future military force. The PLA Ground Force (PLAGF) is undergoing changes to becoming "small, multi-functional and modular units" capable of joint combat, multi-dimensional offense and defense, and trans-theater operations.[50] The PLA Air Force's (PLAAF) mission now extends beyond territorial air defense to include advancing and protecting Chinese interests far beyond the mainland and even into space. In line with this expanded strategic mission, the PLAAF "will boost its capabilities for strategic early warning, air strike, air and missile defense, information countermeasures, airborne operations, strategic projection and comprehensive support."[51] The PLA Navy (PLAN) is the Asia-Pacific region's largest navy, consisting of more than 300 naval vessels and craft, including surface combatants, amphibious ships, mine warships, patrol craft, logistics and support vessels, and submarines.[52] The PLAN is responsible for carrying out the PLA's strategic objective of "offshore waters defense and open seas protection," spurring military capabilities development in areas such as building a larger, more modern submarine force and a stronger surface combatant force.[53] According to the 2015 Chinese defense white paper,

> The seas and oceans bear on the enduring peace, lasting stability and sustainable development of China. The traditional mentality that land outweighs sea must be abandoned, and great importance has to be attached to managing the seas and oceans and protecting maritime rights and interests. It is necessary for China to develop a modern maritime military force structure commensurate with its national security and development interests, safeguard its national sovereignty and maritime rights and interests, protect the security of strategic SLOCs and

47 Ibid., pp. 45–46.

48 U.S. Office of Naval Intelligence (ONI), *The PLA Navy: New Capabilities and Missions for the 21st Century* (Washington, DC: ONI, 2015), p. 5.

49 The State Council Information Office of the People's Republic of China, *China's Military Strategy* (Beijing: PRC, May 26, 2015), available at https://news.usni.org/2015/05/26/document-chinas-military-strategy.

50 Ibid.

51 Ibid.

52 "Flight Fleets Analyzer," *FlightGlobal* database, updated as of November 4, 2018.

53 The State Council Information Office of the People's Republic of China, *China's Military Strategy*.

> overseas interests, and participate in international maritime cooperation, so as to provide strategic support for building itself into a maritime power.[54]

Chinese paramilitary naval forces, namely the China Coast Guard (CCG) and the People's Armed Forces Maritime Militia (PAFMM), support the PLAN and enforce Chinese claims in the contested waters of the East and South China Seas. The CCG, the world's largest coast guard force, performs multiple missions including "enforcement of China's sovereignty claims, surveillance, protection of fisheries, anti-smuggling, and general law enforcement."[55] The PAFMM, the world's only official maritime militia, constitutes China's armed civilian reserve force that can mobilize when conflict arises to augment military maritime forces.[56] Together, these paramilitary forces allow China to employ coercive measures and act aggressively against rival claimants and non-claimant international actors in disputed maritime territories.

The other two military services are the PLA Rocket Force (PLARF), formerly the Second Artillery, and PLA Strategic Support Force (PLASSF). The PLARF oversees China's conventional and nuclear missile forces. The PLASSF manages China's cyber, space, and electronic warfare (EW) capabilities, underlining the importance of these emerging domains to Beijing's warfighting strategy.

Informationized Warfare

As noted above, one of the core elements of the PLA's modernization program lies in developing the capability to fight and win "informatized local wars." The meaning of informatized or informationized warfare is broad, encompassing "warfare where there is widespread use of informationized weapons and equipment and networked information systems" to achieve victory "in joint operations in the land, sea, air, outer space, and electromagnetic domains, as well as the cognitive arena."[57] A key facet of success in these forms of conflict is to gain information superiority over an adversary by ensuring you have as much accurate information about the battlespace as possible, including ensuring access to one's own networked information systems in all domains in the event of conflict, and denying the adversary the information they need to make rapid and well-informed tactical and operational decisions or to effectively use their military forces.

China's growing cyber capabilities and terrestrial- and space-based C4ISR are increasingly giving it greater awareness in all domains. Chinese strategists have also heavily focused on the second tactic, given their most powerful potential adversary, the United States, relies so heavily on exquisite, but vulnerable, information systems for nearly all of its military

54 Ibid.

55 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 71.

56 Ibid., p. 72.

57 Bryan Clark, Mark Gunzinger, and Jesse Sloman, *Winning in the Gray Zone: Using Electromagnetic Warfare to Regain Escalation Dominance* (Washington, DC: Center for Strategic and Budgetary Assessments, 2017), p. 5.

operations. If U.S. forces lost access to general data transmission or GPS during a conflict, units who have not fought without these assets are unlikely to achieve operational success—perhaps even resulting in decision-making paralysis.

A2/AD Capabilities

China's continued economic growth, increasing defense budget, and military modernization have allowed the PLA to harness the precision strike revolution and field robust capabilities to deny adversaries, including the United States and its allies, freedom of movement in the Asia-Pacific theater. It is deploying an increasingly sophisticated reconnaissance-strike complex composed of long-range sensors and precision weapons that threaten to chip away at U.S. military dominance in the Indo-Pacific and hold U.S. and allied air bases, ports, facilities, and personnel at risk. In particular, the PLA has fielded advanced capabilities for large numbers of ballistic and cruise missiles, wide-area surveillance and targeting, integrated air defense systems, advanced fighter-bombers, a large submarine force, modern surface combatants, and hardened command and control networks. The militarization of its artificial islands in the South China Sea has extended China's A2/AD capabilities far beyond the Chinese mainland. Moreover, overseas Chinese bases, such as its newly opened base in Djibouti, could, in the future, be used to host systems that would deny the United States access to critical maritime areas it has long considered safe.

Medium-Range Ballistic and Cruise Missiles

China has one of the world's largest arsenals of short-, medium-, and intermediate-range ballistic missiles as well as ground- and air-launched LACMs, which forms a central component of its A2/AD complex. The PLA currently fields approximately 1,000–1,200 short-range ballistic missiles (SRBM), 200–300 MRBMs, 16–30 intermediate-range ballistic missiles (IRBMs), and 200–300 air- and ground-launched LACMs.[58]

TABLE 1: PLARF GROUND-LAUNCHED BALLISTIC AND CRUISE MISSILE INVENTORY

System	Launchers	Missiles	Estimated Range
ICBM	50-75	75-100	5,400-13,000+ km
IRBM	16-30	16-30	3,000+ km
MRBM	100-125	200-300	1,500+ km
SRBM	250-300	1,000-1,200	300-1,000 km
GLCM	40-55	200-300	1,500+ km

Office of the Secretary of Defense (OSD), *Military and Security Developments Involving the People's Republic of China 2018*, Annual Report to Congress (Washington, DC: DoD, May 16, 2018), p. 125.

58 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 125.

The PLA's SRBM arsenal currently outnumbers all other Chinese missiles, posing a threat to fixed U.S. and allied facilities such as airfields and ports throughout the First Island Chain. China's SRBM arsenal continues to grow in quantity and quality with the deployment of systems such as the DF-16, a road-mobile, solid-fueled SRBM featuring "high accuracy, short preparation time, and an improved maneuverable terminal stage that can better infiltrate missile defense systems."[59]

The growing number, variety, and capabilities of Chinese cruise missiles pose a growing threat to U.S. ground and naval forces in the Western Pacific. For example, anti-ship cruise missiles (ASCMs) feature prominently in the PLAN's growing list of capabilities, supporting China's efforts to deny adversaries near seas access and providing China with an asymmetric advantage against superior U.S. naval power. Capable of being launched by ships, submarines, and aircraft, advanced ASCMs like the YJ-83 provide the PLA with increased operational flexibility.[60]

The PLA's growing inventory of air-launched cruise missiles (ALCM), such as the YJ-63, KD-88, and CJ-20, allow it to attack land or sea targets far from the skies above the Chinese mainland, placing U.S. military bases in Japan and Guam within range of Chinese H-6K bombers equipped with ALCMs.[61] For example, the Chang Jian-20 (CJ-20), an air-launched and potentially nuclear-capable variant of the medium-range CJ-10 ground-launched cruise missile (GLCM), has a range of 1,500–2,000 km and will soon be equipped with improved sensors and guidance capability.[62]

Perhaps the most widely discussed of China's recent military developments is the PLA's deployment of theater-range anti-ship ballistic missiles (ASBM). These ASBMs are purportedly capable of hitting moving targets at sea, making U.S. and allied naval vessels vulnerable to attack from highly accurate missiles that are much more difficult to intercept than ASCMs due to their significantly higher speeds. Two new ballistic missile variants, in particular, have been at the forefront of Chinese research and development: the Dong-Feng-21D (DF-21D) and the DF-26. The DF-21D, colloquially referred to as "the carrier killer," was publicly unveiled in

59 Ibid., p. 36.

60 Ibid., p. 64.

61 Ibid., p. 59.

62 Eric Heginbotham et al., *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996–2017* (Santa Monica, CA: RAND Corporation, 2015), p. 50. There is considerable uncertainty as to whether or not the CJ-20 ALCM is nuclear-capable. Recent DoD reports do not credit the CJ-20 as nuclear-capable, but a fact sheet released alongside the 2018 Nuclear Posture review credited China with a nuclear-capable ALCM. See "Global Nuclear Capability Modernization: Global Nuclear-Capable Delivery Vehicles," DoD, February 2018, available at https://media.defense.gov/2018/Feb/02/2001872878/-1/-1/1/GLOBAL-NUCLEAR-MODERNIZATION.PDF; and OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 63.

the 2015 PLA military parade but is rumored to have been deployed since 2010.[63] The DF-21D contains a maneuverable reentry vehicle (MaRV), a synthetic aperture radar (SAR), and optical sensors, allowing it to make course corrections to strike moving naval targets like an aircraft carrier while simultaneously descending toward impact at several times the speed of sound.[64]

FIGURE 6: DF-26 IRBM DURING PLA PARADE

Photo from Wikimedia Commons.

The longer-range DF-26, an IRBM with a maximum range of 4,000 km, was also unveiled in 2015. Chinese state media claimed it as a new "strategic deterrence weapon" that is "capable of conducting off-road launches of conventional and nuclear warheads" and "can carry out rapid nuclear counterattack and medium- to long-range precision strikes using conventional warheads."[65] The dual-capable DF-26 places Guam, other U.S. bases in the region, and even small portions of Alaska within range of strikes originating from the Chinese mainland.[66] The DF-26 also includes an anti-ship variant, meaning that U.S. vessels in seas as far out as the Second Island Chain, the Strait of Malacca, and the Bay of Bengal may not find easy sanctuary.

63 James R. Holmes, "China's 'Carrier Killer': The DF-21D," *The Diplomat*, November 6, 2012, available at https://thediplomat.com/2012/11/chinas-carrier-killer-the-df-21d/; and Harry Kazianis, "Is China's 'Carrier-Killer' Really a Threat to the U.S. Navy?" *The Buzz* blog, The National Interest, September 2, 2015, available at https://nationalinterest.org/blog/the-buzz/chinas-carrier-killer-really-threat-the-us-navy-13765.

64 Synthetic Aperture Radar (SAR) allows operators to receive broad-area imaging at high resolutions, even in inclement weather and darkness. For more, see "What Is Synthetic Aperture Radar (SAR)?" Sandia National Laboratories, updated as of December 11, 2018, available at https://www.sandia.gov/radar/what_is_sar/; "Synthetic Aperture Radar," Lockheed Martin factsheet, updated as of December 11, 2018, available at https://www.lockheedmartin.com/en-us/products/synthetic-aperture-radar.html; and Ronald O'Rourke, *China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress* (Washington, DC: Congressional Research Service, August 2018), p. 8.

65 Zhao Lei, "Xi Inspects Troops as China's Military Might on Show," *China Daily*, July 30, 2017, available at http://www.chinadaily.com.cn/interface/flipboard/158853/2017-07-30/cd_30295602.html.

66 "Dong Feng-26 (DF-26)," *Missile Threat*, CSIS Missile Defense Project, updated January 8, 2018, available at https://missilethreat.csis.org/missile/dong-feng-26-df-26/.

Chinese and Russian hypersonic weapons development is another cause for concern. Traveling at more than five times the speed of sound with the ability to maneuver unpredictably, operational hypersonic vehicles would likely have a high likelihood of penetrating current U.S. missile defense systems. According to the director of the U.S. Missile Defense Agency, the United States is currently at a "disadvantage" when defending against hypersonic threats because "we, today, do not have systems which can hold them at risk in a corresponding manner, and we don't have defenses against those systems."[67]

Wide-Area Surveillance and Targeting

New missile capabilities offer little utility unless they are paired with the appropriate wide-area surveillance and targeting capabilities. Chinese investments in these programs have begun to pay dividends, with recent Chinese advances in wide-area surveillance and targeting, space capabilities, and real-time imagery allowing China to detect, identify, locate, track, and target moving U.S. warships.[68] The range of these sensors, which include electro-optical surveillance satellites and over-the-horizon (OTH) radars, provides the PLA the ability to track and target U.S. surface platforms well beyond the range of American missiles.

The PLA has also invested heavily in the C4ISR systems necessary to conduct complex military operations. In an effort to maintain the integrity of its C4ISR capability and increase its technological independence, China is fielding the Beidou satellite navigation system as an alternative to the U.S. Global Positioning System (GPS) constellation. The Chinese government has endeavored to proliferate the use of Beidou for commercial operations regionally, such as installing Beidou in all new cars in China by 2020 and extending Beidou coverage to all Belt and Road Initiative (BRI) countries by the end of 2018.[69] The PLA uses Beidou for its precision strike systems.

Integrated Air Defense System (IADS)

The PLA's IADS architecture is a critical component of its A2/AD complex, as it acts in synergy with the offensive missile systems it defends. Chinese ballistic and cruise missile strikes against U.S. and allied air bases and naval forces would suppress the ability of the United States to marshal its forces and deliver decisive striking power. Chinese IADS would

67 Lieutenant General Samuel A. Graves, U.S. Air Force, Director U.S. Missile Defense Agency, testimony before the Senate Appropriations Committee, Subcommittee on Defense, April 11, 2018, available at https://www.appropriations.senate.gov/imo/media/doc/041118%20-%20FY19%20MDA%20Greaves%20Testimony1.pdf; and Christian Davenport, "Why the Pentagon Fears the U.S. Is Losing the Hypersonic Arms Race with Russia and China," *Washington Post*, June 8, 2018, available at https://www.washingtonpost.com/business/economy/why-the-pentagon-fears-the-us-is-losing-the-hypersonic-arms-race-with-russia-and-china/2018/06/08/7c2c3b4c-57a7-11e8-b656-a5f8c2a9295d_story.html?utm_term=.fb1ef59db6ce.

68 Kazianis, "Behind the China Missile Hype."

69 Pratik Jakhar, "How China's GPS 'Rival' Beidou Is Plotting to Go Global," *BBC*, September 20, 2018, available at https://www.bbc.com/news/technology-45471959.

push remaining non-stealth U.S. forces away from the Chinese homeland, forcing them to rely upon a relatively small number of long-range munitions, and defend against those aircraft and missiles that penetrate close-in contested airspace.

Extending over land areas and stretching out nearly 300 nm from its coastline, China's modernized air defenses link an extensive network of early warning radars, fighter aircraft, and a wide variety of SAM systems to protect the Chinese mainland and deployed Chinese forces.[70] The PLA boasts one of the largest and advanced SAM systems in the world, with layers of systems ranging from point defense to strategic air defense. Most of China's IADS currently consist of Russian S-300 and indigenous HQ-9 battalions.[71] However, with the acceptance of its first Russian S-400 Triumf SAM system in July 2018, the PLA is adding layers of longer-range strategic air defenses with more sophisticated radars than prior Chinese systems.[72]

The PLA is also developing the HQ-19. In testing since 2016, the HQ-19 is a land- and sea-based mid-course missile defense interceptor equipped with indigenous radars that can track multiple ballistic missiles and has been tested, with unknown results, against 3,000 km range-class ballistic missiles. An updated variant of the HQ-9, the HQ-19 is the Chinese counterpart to the U.S. Terminal High Altitude Area Defense (THAAD) System designed to intercept MRBMs with a "kinetic kill vehicle" capable of targeting ballistic missiles and potentially even satellites in low earth orbit.[73] There are signs that the HQ-19 may have begun preliminary operations in western China.[74]

Whereas existing Chinese IADS threaten U.S. forces in the skies over and adjacent to the Chinese mainland, China's artificial island-building in the South China Sea has led to a major extension of its IADS complex. Despite Xi Jinping's promise to U.S. President Barack Obama in 2015 that these islands would not be militarized, more than half a dozen islands dredged by the Chinese have now become military bases, complete with assets like radar domes, SAM shelters, and runways.[75]

70 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, pp. 61–62.

71 Ibid., p. 60.

72 Ibid.

73 Dave Majumdar, "Why China's New Air Defense System Could be Quite Dangerous," *The Buzz* blog, The National Interest, July 16, 2018, available at https://nationalinterest.org/blog/buzz/why-chinas-new-air-defense-system-could-be-quite-dangerous-25956.

74 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 87.

75 Hannah Beech, "China's Sea Control Is a Done Deal, 'Short of War with the U.S.'," *New York Times*, September 20, 2018, available at https://www.nytimes.com/2018/09/20/world/asia/south-china-sea-navy.html.

5th Generation Fighters

An increasingly modern force of fighter aircraft contributes to China's IADS complex. Although the PLAAF still flies many 2nd and 3rd generation fighters such as the J-7 and J-8, the PLAAF is on the verge of becoming a majority 4th generation air force within "the next several years," and is beginning the process of fielding 5th generation fighter aircraft.[76] These 5th generation fighters, like the J-20 and the FC-31/J-31, are both considered by the DIA to be in development, though the J-20 has likely begun active service in limited testing and training roles.

New missiles launched by these 5th generation fighters will pose a considerable threat to U.S. airborne early warning and control (AEW&C) and refueling aircraft, reducing the reach of U.S. fighter aircraft in theater. The PL-15, for example, "supports an electronically-scanned array radar that makes evasion difficult for the most agile of fighter jets."[77] Thus, the PLAAF's fleet of 5th generation fighters could greatly degrade the U.S. ability to carry out its preferred concepts of operations in a future conflict with China.

Advanced Bombers and Fighter-Bombers

The PLAAF has benefited from advances in long-range precision strike, and a new generation of advanced PLAAF bombers and fighter-bombers equipped with new air-launched weapon systems are extending China's A2/AD and power projection capabilities far beyond the mainland. Chinese fighter-bomber strikes on U.S. forward bases can deliver more firepower and place U.S. and allied forces at greater risk than ground-based MRBMs. The continued development of more advanced and versatile H-6 bomber variants and the eventual deployment of stealth bombers portend greater challenges to the United States and its allies in the future.

The mainstay of the PLAAF's bomber force is the H-6K. A domestically designed and manufactured fixed-wing aircraft based on the 1950s-era Soviet Tu-16 Badger, the H-6K "is a modern aircraft with a much-improved airframe, sensors and propulsion."[78] Although not capable of reaching the continental United States, the H-6K can still deliver a significant payload to theater targets in the form of ASCMs, LACMs, or other precision-guided munitions.[79]

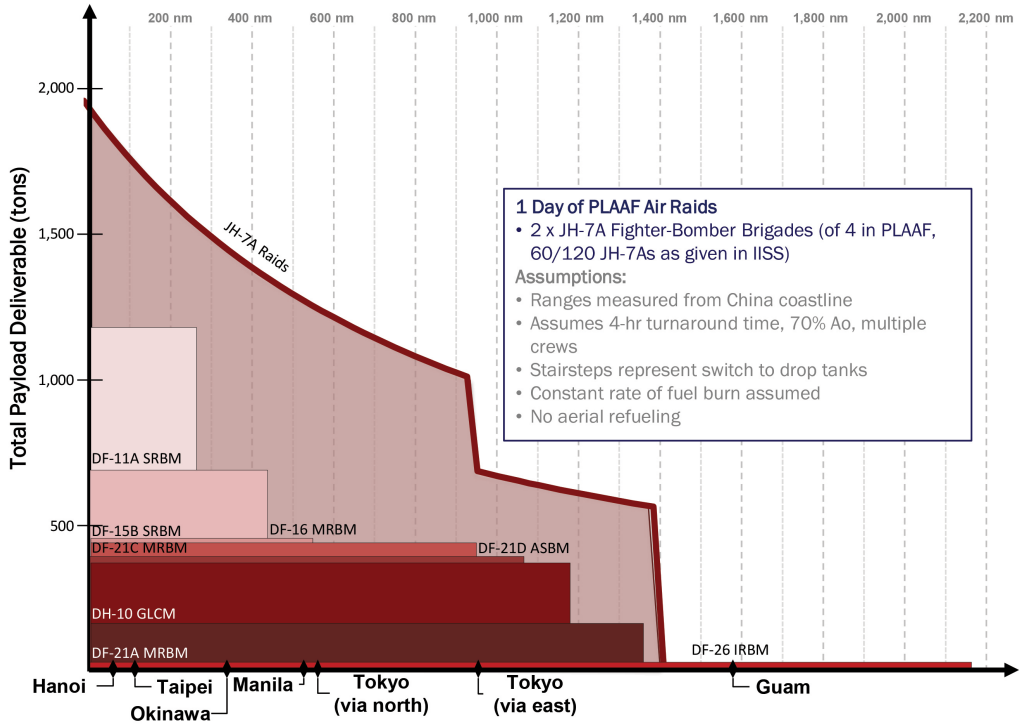
76 Defense Intelligence Agency (DIA), *China Military Power: Modernizing a Force to Fight and W*in (Washington, DC: DoD, January 15, 2019), p. 85.

77 Ibid.

78 TNI Staff, "China's H-6K: The 'Old' Bomber That Could 'Sink' the U.S. Navy," *The Buzz* blog, The National Interest, May 21, 2018, available at https://nationalinterest.org/blog/the-buzz/chinas-h-6k-the-old-bomber-could-sink-the-us-navy-25913.

79 DIA, *China Military Power*, pp. 37, 85.

FIGURE 7: PAYLOAD DELIVERABLE BY CHINESE MISSILES AND AIRCRAFT



According to the DIA, the PLA is also developing two new stealth bombers, both of which could potentially make their initial debuts as early as 2025.[80] The first, commonly referred to as the H-2 and believed to be similar to the U.S. B-2 Spirit stealth bomber, would be China's first strategic bomber. As a platform capable of carrying nuclear or conventional payloads to nearly 5,000 miles and back without needing to refuel, it represents China's completed development of the air leg of the nuclear triad and could provide a credible nuclear threat to CONUS.[81] The second stealth bomber, referred to by the DIA only as a "tactical bomber" but elsewhere known as the JH-XX, has no counterpart in the current U.S. air fleet. Larger than normal fighter-bombers but believed to be smaller than the H-6, it is estimated to have a much smaller range than the H-20 at 1,000–2,000 miles. Unlike the H-6, which is primarily an attack platform, the JH-XX is expected to be uniquely multi-role for an aircraft of its size and have stealth attributes, making it a lethal threat to land, sea, and air targets throughout the Western Pacific and South and Southeast Asia.[82]

80 Ibid.

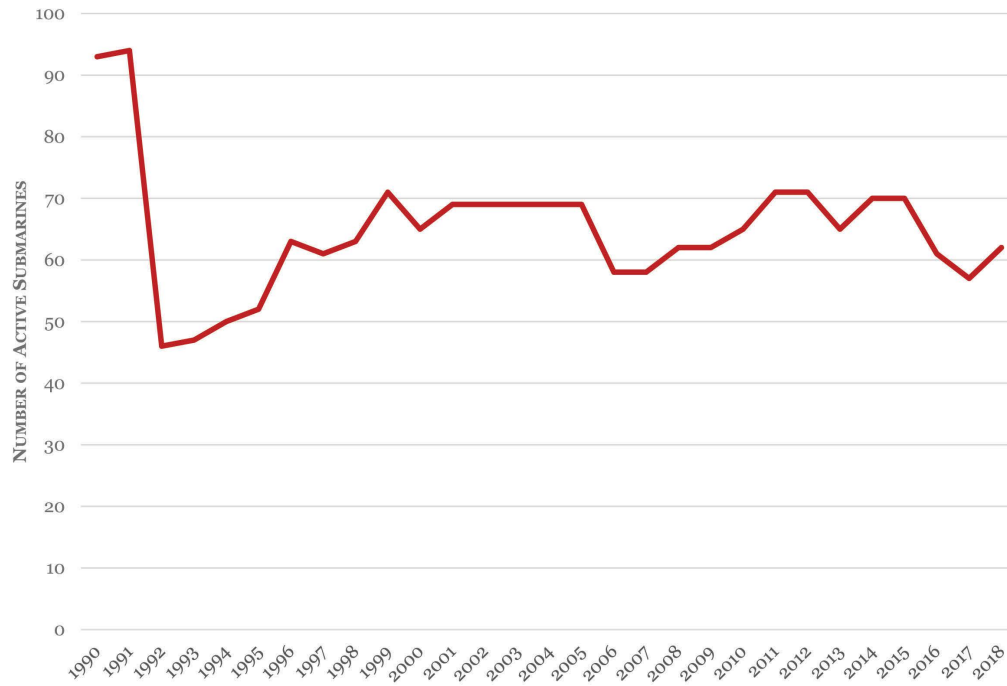
81 Ibid; and Tyler Rogoway and Joseph Trevithick, "Intel Report Confirms China Developing Tactical Bomber in Addition to Strategic Bomber," *The Drive*, January 16, 2019, available at http://www.thedrive.com/the-war-zone/25989/intel-report-confirms-china-developing-stealthy-regional-bomber-in-addition-to-strategic-bomber.

82 Ibid.

Submarines

Although PLAN submarine force numbers have remained between 60 and 70 over the past two decades, China has fielded increasingly modern and lethal nuclear attack submarines (SSN) and diesel-electric submarines (SSK). Armed with a combination of ASCMs, wire-guided and wake-homing torpedoes, and mines, Chinese submarines are becoming quieter, making them harder to detect as new weapons make them more capable of attacking U.S. surface forces at standoff distances.[83]

FIGURE 8: SIZE OF PLAN SUBMARINE FORCE (1990–2018)



International Institute for Strategic Studies (IISS), *The Military Balance 2018* (London: IISS, 2018).

As China expands the number of ASCM-capable submarines in its inventory, the PLAN plans to add a guided-missile nuclear attack submarine (SSGN) variant of the *Shang*-class SSGN, the Type 093B, to its undersea forces by the mid-2020s, which would boost the PLAN's anti-surface warfare capabilities and provide it with a stealth land-attack option.[84] ASCM-equipped Chinese submarines would be more capable of ambushing or interdicting U.S. naval forces than current submarines, and submarines equipped with LACMs would increase the salvo size of Chinese ground-based missile strikes on U.S. forward bases.

83 O'Rourke, *China Naval Modernization*, p. 12.

84 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 29.

China is also developing unmanned underwater vehicles (UUVs) capable of a wide range of missions, "from reconnaissance to mine placement to even suicide attacks against enemy vessels."[85] According to the Congressional Research Service, some Chinese artificial intelligence (AI)-enabled UUVs in development are "giants" compared to the UUVs currently in use or testing. These extra-large UUVs are capable of docking like normal submarines and possess cargo bays large enough to house a wide variety of weapons, sensors, or cargo for a broad spectrum of missions like underwater surveillance equipment, missiles, or torpedoes.[86] Such UUVs could be used to emplace underwater sensors as well as to disrupt or damage friendly underwater infrastructure. Some observers have speculated that UUVs will be integral to purported Chinese plans to create an "underwater great wall" with undersea sensors to detect U.S. and Russian submarines and boost the nation's control of the South China Sea.[87] In terms of offensive capability, UUVs that can find and manipulate seafloor objects could tap into or sever undersea cables to exert economic pressure or create a contested information environment, much like Russia did in Crimea.[88] Given the high importance placed on developing the PLA's submarine forces, China will continue to augment its undersea warfare capabilities with the latest technological advances.

Modern Surface Combatants

Perhaps the most visible manifestation of China's blue water navy ambitions is the PLAN's efforts to build aircraft carriers to project power beyond China's periphery. China refurbished an old Soviet vessel as its first aircraft carrier, the *Liaoning*, which was commissioned in September 2012. In 2017, the PLAN launched its first domestically built aircraft carrier, the Type 001A.[89] In November 2018, the PLAN was already in the process of building a third aircraft carrier, which likely features catapults rather than a ski jump, giving it the capability to launch fighter jets more efficiently.[90]

85 O'Rourke, *China Naval Modernization*, p. 19.

86 Ibid., p. 19.

87 Ewen Levick, "China's 'Underwater Great Wall'," *Maritime Executive*, June 18, 2018, available at https://www.maritime-executive.com/editorials/china-s-underwater-great-wall.

88 Ibid.

89 "What Do We Know (So Far) about China's Second Aircraft Carrier?" *China Power*, Center for Strategic and International Studies, updated as of December 10, 2018, available at https://chinapower.csis.org/china-aircraft-carrier-type-001a/.

90 Ben Westcott, "China Reveals New Domestically-built Aircraft Carrier Under Construction," *CNN*, November 27, 2018, available at https://www.cnn.com/2018/11/26/asia/china-third-aircraft-carrier-intl/index.html.

FIGURE 9: LAUNCHING OF CHINA'S SECOND AIRCRAFT CARRIER, 2017

Photo from Wikimedia Commons.

Beijing is also investing in other surface combatants, such as cruisers and destroyers that "can carry an array of long-range ASCMs and long-range SAMs, and will likely be able to launch ASBMs and LACMs once these weapons are available."[91] To fulfill its blue water ambitions, the PLA's naval forces must project military power far from the Chinese mainland and be capable of executing and maintaining distant sea operations, requiring Beijing to possess a variety of naval vessels equipped with a number of defensive and offensive capabilities. As a result, the PLAN now has a "sizable force of high-capability logistical replenishment ships to support long-distance, long-duration deployments, including two new ships being built specifically to support aircraft carrier operations."[92] It is also developing new guided-missile destroyers (DDGs) and guided-missile frigates (FFGs) and "rapidly replacing obsolescent, generally single-purpose platforms in favor of larger, multi-role combatants featuring advanced anti-ship, anti-air, and anti-submarine weapons and sensors."[93] These warships are equipped with a variety of ASCMs, SAMs, and anti-submarine weapons loaded in vertical launch systems.

China's increased maritime activity in the East and South China Seas necessitates augmented littoral warfare capabilities and naval platforms capable of offshore and long-distance power projection. PLA investments in its submarine forces run in tandem with improving its ASW capabilities. The PLAN's development of anti-submarine warships (FFL Type 056) resulted in more than 35 *Jiangdao*-class corvettes with towed-array sonar entering service in 2017.[94]

Research and development of unmanned surface vehicles (USVs) also raise concerns over their anti-surface warfare (ASuW) and ASW capabilities, particularly with their ability to

91 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 66.

92 Ibid.

93 Ibid., p. 28.

94 Ibid., p. 30.

swarm much larger and more heavily armed U.S. surface combatants. These USVs could be used in sea battles and military patrols, operating "with high efficiency in escorting, minesweeping, intelligence gathering and amphibious operations" by military and paramilitary sea forces.[95]

The China Coast Guard (CCG) and People's Armed Forces Maritime Militia (PAFMM) have played an increasingly prominent role given the PLAN's increased activity in the East and South China Seas and the extension of their naval mission. In 2013, China consolidated four government agencies into the CCG, making the fleet responsible for maritime administration, policing, customs, and fisheries. It has multiple missions, including "enforcement of China's sovereignty claims, surveillance, protection of fisheries, anti-smuggling, and general law enforcement."[96] The largest coast guard in the world with more than 160 ships, the CCG can often be seen patrolling contested waters.[97] Initially under civilian control, the CCG was later subsumed into the People's Armed Police (PAP) in March 2018, placing the CCG under military authority.[98] The switch in authority underscores what many outside observers of China had long suspected, namely that the CCG could support PLAN operations in the event of future conflict. Now, the CCG can "train and equip itself to conduct combat operations" and lend wartime support to the PLAN in the event of kinetic operations.[99] The PAFMM is an "armed reserve force of civilians available for mobilization" and is "the only government-sanctioned maritime militia in the world."[100] Together, these paramilitary forces allow China to employ coercive measures and act aggressively against rival claimants and non-claimant international actors in disputed maritime territories.

Underground Facilities (UGF)

One critical underpinning of the PLA's A2/AD complex is the survivability and tactical unpredictability granted to A2/AD systems from China's network of thousands of hardened and technologically advanced underground facilities (UGF), which the PLA sometimes refers to as its "Underground Great Wall."[101]

95 Ibid.

96 Ibid., p. 71.

97 Liu Zhen, "China's Military Police Given Control of Coastguard as Beijing Boosts Maritime Security," *South China Morning Post*, March 21, 2018, available at https://www.scmp.com/news/china/diplomacy-defence/article/2138257/chinas-military-police-given-control-coastguard-beijing.

98 Ibid.

99 Lyle Morris, "China Welcomes Its Newest Armed Force: The Coast Guard," *War on the Rocks*, April 4, 2018, available at https://warontherocks.com/2018/04/china-welcomes-its-newest-armed-force-the-coast-guard/.

100 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 72.

101 Hui Zhang, "China's Underground Great Wall: Subterranean Ballistic Missiles," *Power and Policy* blog, Belfer Center for Science and International Affairs, January 31, 2012, available at https://www.belfercenter.org/publication/chinas-underground-great-wall-subterranean-ballistic-missiles.

Designed initially to protect Chinese nuclear forces and C2 from a nuclear first strike or strikes by precision-guided conventional weapons, these tunnels also serve to protect and mask military operations and assets from adversaries.[102] UGF construction accelerated in 1991 after China witnessed the potency of U.S. air power during the First Gulf War. Missile launchers could exit the tunnel system, fire their nuclear or conventional missiles at U.S. or allied targets, and return back to safety before a U.S. strike asset could destroy them. If Chinese missiles can continuously return to the tunnels for safety and exit far from their previous locations and fire again, then Beijing has the ability to sustain a prolonged A2/AD campaign against U.S. forces. Although launchers in the tunnels are not invulnerable to U.S. conventional strikes, the difficulty of penetrating through hundreds of meters of earth likely makes targeting these systems cost-prohibitive.

The tunnel systems also facilitate Chinese warfighting capabilities by protecting the C4 and intelligence infrastructure that undergird Beijing's nuclear forces and much of its conventional strike forces. By protecting command and control deep underground, Chinese forces can have greater assurances that C2 systems directing A2/AD units will remain intact during a conflict, maintaining the integrity of various missiles' kill-chains and ensuring the Chinese government will retain some command and control of nuclear forces after absorbing a nuclear first strike.[103]

Nuclear Forces

China's comprehensive military modernization efforts include its nuclear forces, and China stands on the precipice of finally achieving a mature nuclear strategic triad. Since its first nuclear test in 1964, China has adhered to its no-first-use policy and maintained a limited nuclear stockpile to sustain a nuclear deterrent and credible second-strike capability against potential adversaries. This is because the Chinese government appears to believe that nuclear weapons have limited utility beyond deterrence and, therefore, is believed not to mate its nuclear warheads to missiles in peacetime.[104] Despite this traditionally limited nuclear posture and the lack of transparency regarding the size of China's nuclear arsenal, it is fairly clear that China is the only one of the five permanent members of the United Nations Security Council to be actively increasing the number of strategic nuclear weapons in its inventory.[105] This increase in strategic weapons gives China the ability to strike CONUS with significantly more nuclear weapons than a decade ago and from multiple domains.[106]

102 DIA, *China Military Power*, p. 50.

103 Ibid.

104 David Logan, "Hard Constraints on China's Nuclear Forces," *War on the Rocks*, November 8, 2017, https://warontherocks.com/2017/11/china-nuclear-weapons-breakout/.

105 Heginbotham et al., *China's Evolving Nuclear Deterrent*, p. 4.

106 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 78.

The United States has historically been the primary, although not the only, driver of China's nuclear force structure. In recent decades, the proliferation and sophistication of U.S. missile defense systems have catalyzed Chinese nuclear force increases, as Beijing believes it must raise the quality and quantity of its offensive nuclear force levels to ensure a credible second-strike capability.[107] Beyond the United States, however, other nuclear weapons states in Asia that factor into China's strategic calculus include Russia, India, and North Korea. Changes to the nuclear posture or doctrine of these countries could spur further increases to Beijing's arsenal of strategic and theater nuclear weapons to ensure the survivability of its nuclear forces in a multipolar nuclear world.[108]

TABLE 2: WORLD NUCLEAR FORCES, JANUARY 2018

Country	Deployed Warheads	Other Warheads	Total Warheads, 2018
United States	1,750	4,700	6,450
Russia	1,600	5,250	6,850
United Kingdom	120	95	215
France	280	20	300
China	-	280	280
India	-	130-140	130-140
Pakistan	-	140-150	140-150
North Korea	?	?	(10-20)
TOTAL	**3,750**	**10,715**	**14,465**

Stockholm International Peace Institute, SIPRI Yearbook 2018: Armaments, Disarmament, and International Security (Oxford, United Kingdom: Oxford University Press, 2018), p. 236.

China's nuclear warhead stockpile is expanding from an estimated 130–200 warheads in 2006 to about 280 in 2018.[109] China may possess the industrial and technological capacity that could eventually allow for nuclear parity. However, it appears that its limited stockpile of fissile material, and its assumed lack of production of weapons-grade plutonium since 1991,

107 Heginbotham et al., *China's Evolving Nuclear Deterrent*, p. 13.

108 Others have noted constraints on China's ability to rapidly scale up its nuclear forces because limits on the availability of fissile material. See for instance, David C. Logan, "Hard Constraints on a Chinese Nuclear Breakout," *The Nonproliferation Review* 24, no. 1-2.

109 Robert S. Norris and Hans M. Kristensen, "Chinese Nuclear Forces, 2006," *Bulletin of the Atomic Scientists*, May 1, 2006; and Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2018," *Bulletin of the Atomic Scientists*, June 28, 2018.

hampers the potential for any rapid increase of nuclear weapons beyond a couple hundred warheads.[110]

Since the end of the Cold War, China's nuclear forces have shifted from relying primarily on liquid-fueled and ground-launched MRBMs and IRBMs to solid-fueled ground and sea-based intercontinental missiles and medium-range ground- and air-launched nuclear systems.[111] These solid-fueled systems allow China's missiles to launch more rapidly from mobile, thus more survivable, platforms.[112]

The PLA currently fields a variety of platforms capable of launching nuclear weapons from land, sea, and air. China's ground-based platforms include silo-based and road-mobile Dong-Feng-missile variants.[113] In making its ICBMs road-mobile, the PLA will increase the survivability of its land-based nuclear weapons by making them harder to detect, track, and target. The PLA is working on putting MIRVs on updated versions of its aging, silo-based ICBMs like the DF-5B while also developing the road-mobile DF-41 ICBM to have a MIRV capability. This gives China the ability to increase the number of deployed warheads without increasing the number of deployed missiles.

Beijing's sea-based nuclear deterrent consists of four *Jin*-class SSBNs with 12 JL-2 SLBMs, and at least one or two more under construction. While the *Jin*-class represents "China's first credible at-sea second-strike nuclear capability," it still must transit several key chokepoints to reach the areas in the Pacific where the JL-2 can strike CONUS.[114] However, the development of the new JL-3 SLBM and Type 096 SSBN, set to begin construction in the early 2020s, are likely to allow Chinese SSBNs to launch their missiles from safer and friendlier waters.[115]

The H-20 strategic stealth bomber will complete China's development of a secure strategic nuclear triad. Together, this burgeoning Chinese strategic nuclear triad represents more and more a near-peer nuclear capability that can threaten the U.S. homeland. If the United States continues to be in strategic competition with both China and Russia at once, it may soon find itself in the situation where it must deal with two nuclear adversaries whose arsenals, when combined, are superior to its own. This multipolar nuclear dynamic has the potential to disrupt the traditional U.S. nuclear posture.

110 Logan, "Hard Constraints on China's Nuclear Forces."

111 Heginbotham et al., *China's Evolving Nuclear Deterrent*, p. xi.

112 Kristensen and Norris, "Chinese Nuclear Forces, 2018."

113 The PLA's ground-based nuclear systems include silo-based CSS-4 Mod 2 (DF-5A) and Mod 3 (DF-5B); solid fuel, road-mobile CSS-10 Mod 1 and Mod 2 (DF-31 and DF-31A); limited-range CSS-3 (DF-4); DF-31AG (enhanced DF-31A ICBM with TEL); road-mobile solid fuel CSS-5 Mod 2 and Mod 6 (DF-21); and DF-26. For more information, see Heginbotham et al., *China's Evolving Nuclear Deterrent*.

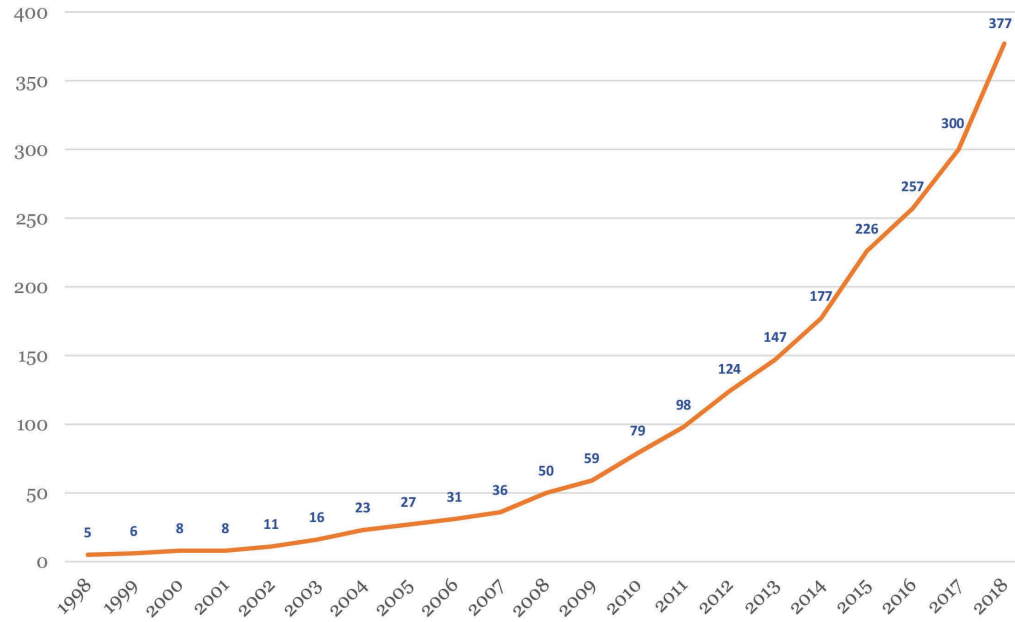
114 ONI, *The PLA Navy*; and "Does China Have an Effective Sea-based Nuclear Deterrent?" *China Power*, Center for Strategic and International Studies, December 4, 2018, available at https://chinapower.csis.org/ssbn/.

115 Heginbotham et al., *China's Evolving Nuclear Deterrent*, p. 108.

Space Capabilities

Space-based satellite systems form the backbone of modern-day communications, global navigation, and data transmission for military, civilian, and commercial purposes. Satellites are the conduit through which the world sees and hears from any point in the world, and they allow militaries to operate on the ground, in the air, and across the seas. National economies and governments rely on satellites to carry out day-to-day operations and support the continued function of modern daily life as we know it.

FIGURE 10: CUMULATIVE TOTAL NUMBER OF CHINESE SATELLITE LAUNCHES



Union of Concerned Scientists, "UCS Satellite Database," last revised August 10, 2018, available at https://www.ucsusa.org/nuclear-weapons/space-weapons/satellite-database#.XAqxSmhKjIV.

Chinese military strategy documents state that "whoever is the strongman of military space will be the ruler of the battlefield,"[116] emphasizing the strategic perception of space as a potential battleground. Chinese military strategists recognize the crucial role space will play in the future and have made concerted efforts to develop its domestic commercial and military space programs. For the Chinese, robust and resilient military space capabilities serve a variety of functions: to enable strategic deterrence, to prepare the PLA to win informationized local wars, to prevent U.S. military intervention in the region, to protect Chinese national interests abroad, and to support PLA operations far from the mainland.

116 Jiang Lianju and Wang Liwen, eds., *Textbook for the Study of Space Operations* (Beijing: Military Science Publishing House, 2013), p. 6.

Though not intended to streamline all of China's space enterprise under one command, the PLASSF is responsible for facilitating the integration of information warfare, cyberspace, space, and EW capabilities into joint operations capable of conducting informationized warfare.[117] The PLASSF's space responsibilities range from the research and development of space and counterspace capabilities, satellite launch, and operations to support PLA ISR, navigation, and communication requirements.[118]

The PLASSF has a robust array of counterspace sensors capable of searching, tracking, and characterizing adversary space assets and is expanding its weapons toolkit to disable and destroy the satellites it tracks. China has possessed some counterspace capability since at least 2007, when it successfully conducted an anti-satellite (ASAT) missile test that destroyed an aging Chinese weather satellite in low earth orbit (LEO).[119] According to a 2019 DIA report on space security, this ground-based kinetic ASAT capability is now operational and can threaten U.S. assets throughout LEO. China is also probably pursuing ASAT weapons capable of destroying adversary satellites as far out as geostationary orbit (GEO). China is also developing a co-orbital ASAT system that could incapacitate U.S. space assets using "an explosive charge, fragmentation device, kinetic energy weapon, laser, radio frequency weapon, jammer, or robotic arm."[120] In the event that any of its counterspace weapons create a significant amount of space debris, which can negatively impact future Chinese access to space, China is conducting research on ways for satellites in orbit to rapidly clean up space debris.[121]

However, Chinese counterspace capabilities are not entirely reliant on kinetic weapons. China routinely incorporates jamming and counter-jamming in exercises, targeting space-based radar systems, GPS satellites, and both commercial and military protected satellite communication (SATCOM).[122] China is likely pursuing and will likely field directed energy weapons to disable and even damage LEO space-based sensors by 2020. By the mid-to-late 2020s, the DIA assesses China may field a directed energy system high-powered enough to damage the structure of satellites rather than just blind their sensors.[123]

Beginning in late 2019, China will start launching a series of ten satellites in three phases from Hainan that will allow China to monitor the South China Sea 24 hours a day, giving

117 Pollpeter, Chase, and Heginbotham, *The Creation of the PLA Strategic Support Force*, p. 1.

118 Ibid., p. ix.

119 William J. Broad and David E. Sanger, "Flexing Muscle, China Destroys Satellite in Test," *New York Times*, January 19, 2007, available at https://www.nytimes.com/2007/01/19/world/asia/19china.html.

120 Vasani, "How China is Weaponizing Outer Space."

121 DIA, *Challenges to Security in Space* (Washington, DC: DoD, 2019), p. 21.

122 Ibid., p. 20.

123 Ibid.

Beijing the ability to surveil the contested waters continuously.[124] Yang Tianling, director of the Sanya Institute of Remote Sensing, stated that the Hainan satellite constellation system will "reinforce national sovereignty" and give the Chinese government the ability to "speed up their response to emergencies, more effectively administer the South China Sea, and improve exploration and development of the resource-rich waters."[125] The latter two phases of satellite launches will include launches of high-resolution SAR and hyperspectral satellites, which will allow Beijing to conduct remote-sensing across the wide expanse of the South China Sea. These advances in satellite technology, coupled with the PLA's military modernization developments, particularly with regard to its maritime forces, all contribute to China's maturing A2/AD capabilities.

Cyber Capabilities

Much like space, cyber, often referred to in PLA writings as the "network domain," constitutes a new warfighting domain in China's military strategy. The allure of advanced cyber capabilities stems from its effectiveness as a low-cost deterrent to adversary attack and its highly destructive potential as an unconventional—and sometimes undetectable—offensive and counter-offensive weapon. Many countries, particularly highly-networked societies like the United States, have critical infrastructure and systems reliant on the internet and computers, which creates innumerable vulnerabilities to offensive cyber operations. This provides nations like China the ability to cause significant damage to adversary economic functions and logistics networks.

PLA writings on its modernization programs stress that future warfare will revolve around system-of-systems and require flexibility, adaptability, and innovation of its military forces and doctrine to win informationized wars. Chinese military writings have characterized "informatized warfare as the use of information technology to create an operational system-of-systems allowing the PLA to acquire, transmit, process, and use information to conduct joint military operations across the domains of land, sea, air, space, cyberspace and the electromagnetic spectrum during a conflict."[126] Therefore, the PLASSF's cyber responsibilities include network attack and defense units, its space-based functions involve reconnaissance and navigation satellites, and its EW portfolio handles countering enemy radar and communications.[127]

124 Kristin Huang, "China Unveils Satellite Network Plan for Round-the-clock Lock on South China Sea," *South China Morning Post*, December 15, 2017, available at https://www.scmp.com/news/china/diplomacy-defence/article/2124555/china-unveils-satellite-network-plan-round-clock-lock; and Liu Zhen, "String of Chinese Satellites to Keep Real-time Watch on South China Sea to 'Reinforce National Sovereignty'," *South China Morning Post*, August 16, 2018, available at https://www.scmp.com/news/china/diplomacy-defence/article/2159891/string-chinese-satellites-keep-real-time-watch-south.

125 Zhen, "String of Chinese Satellites to Keep Real-time Watch on South China Sea"; and "South China Province Plans Remote Sensing Satellites," *Xinhua Net*, August 14, 2018, available at http://www.xinhuanet.com/english/2018-08/14/c_137389819.htm.

126 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, p. 73.

127 Pollpeter, Chase, and Heginbotham, *The Creation of the PLA Strategic Support Force*, p. 16.

Commercial developments in cyber technology can easily be adapted to military purposes, and the blurred line between China's private and public sectors lends China the ability to capitalize on commercial technological advances to bolster its military capabilities at speeds which the Pentagon may struggle to achieve with an independent, and often military-skeptical, Silicon Valley.

The Chinese government has repeatedly stressed cyber space as a critical national security domain and conduit for economic and social development. Conversely, cyber operations also provide strategic threats to U.S. security in peacetime. The linkages between China's private and public sectors also provides benefits to Chinese companies, as they may gain access to an American company's intellectual property, gathered as a result of state cyber operations rather than through private sector business dealings.[128] This has the strategic effect of speeding up China's research and development (R&D) cycle while damaging the health of the U.S. National Security Innovation Base (NSIB).

While cyberattacks are always occurring to some degree among the major powers in ways that would never occur kinetically, cyber operations are still relatively untested in high-end warfare. Cyber capabilities are not stand-alone assets but rather supplementary or complementary to joint operations. As a part of informationized warfare, the PLA intends to use cyber operations to gain information dominance by disrupting, denying, degrading, or destroying an adversary's command and control and ISR networks in the initial phases of a future conflict, as well as harm adversary mobilization by targeting its logistics systems.[129] For China, cyber capabilities "serve as a force multiplier when coupled with kinetic attacks during times of crisis or conflict."[130] Through this, Chinese cyber capabilities represent one of the most potent means through which China could deny the United States access to information and complicate its pursuit of its traditional operational concepts.

128 Diane Bartz and Jack Stubbs, "U.S., Allies Slam China for Economic Espionage, Spies Indicted," *Reuters*, December 20, 2018, available at https://www.reuters.com/article/us-china-cyber-usa-idUSKCN1OJ1VN.

129 OSD, *Military and Security Developments Involving the People's Republic of China 2018*, pp. 74–75.

130 Ibid.

CHAPTER 4

Questionable Strategic and Operational Assumptions

The strategic community in the United States as a whole has taken a quarter-century respite from thinking seriously about great power competition and conflict. The United States experienced a period of geopolitical dominance after the end of the Cold War that is rare in world history. Throughout the first decade following the end of the Cold War, the United States found itself essentially unopposed. The Soviet Union had collapsed, and China's rise had just begun. U.S. defense planning focused on the threats posed by regional aggressors such as Iraq, Iran, and North Korea.[131] That tranquility was shattered by the September 11, 2001 terrorist attacks, followed by a period of protracted war in Iraq, Afghanistan, and beyond. If the challenge in the 1990s was planning in the absence of a serious threat, in the decade and a half that followed, it was waging war against irregular adversaries. Although Al Qaeda and its affiliates posed challenges to the United States, they did not contest supremacy in any domain of conventional warfare.

During this period, defense planners emphasized the need to wage and win the wars we were fighting over the responsibility to prepare for the wars we might have to fight in the future.[132] For example, in 2008 Secretary of Defense Robert Gates criticized the Defense Department for what he termed "Next-War-itis," which he characterized as the Services' emphasis on developing capabilities useful for some "hard to conceive" conventional great power war when "the kinds of capabilities we will most likely need in the years ahead will often resemble the kinds

131 Eric S. Edelman, "The Strange Career of the 1992 Defense Planning Guidance," in Melvyn P. Leffler and Jeffrey W. Legro, eds., *In Uncertain Times: American Foreign Policy After the Berlin Wall and 9/11* (Ithaca, NY: Cornell University Press, 2011), pp. 63–77; Hal Brands, "Choosing Primacy: U.S. Strategy and Global Order at the Dawn of the Post-Cold War Era," *Texas National Security Review* 1, no. 2; and Alexandra Homolar, "How to Last Alone at the Top: U.S. Strategic Planning for the Unipolar Era," *The Journal of Strategic Studies* 34, no. 2, 2011.

132 Gunzinger, *Sizing and Shaping America's Military*; and Gunzinger, Clark, Johnson, and Sloman, *Force Planning for The Era of Great Power Competition*.

of capabilities we need today."[133] For a decade and a half after September 11, the U.S. focused its attention on counterterrorism (CT) and counterinsurgency (COIN) while investing in capabilities—like special operations forces (SOF) and Mine-Resistant Ambush-Protected (MRAP) vehicles—that would be of limited utility if any near-peer power did decide to directly challenge U.S. dominance.

That dominance was reinforced by the fact that the United States possessed unilateral military advantages, particularly in precision-strike and information capabilities. In 2009, when Secretary Gates' decision to shut down production of the F-22 fighter aircraft prematurely was criticized for its impact on the U.S. ability to carry out conflict with a near-peer competitor, Gates argued that the U.S. possessed a large enough technological edge over any potential adversary that it could afford to turn its attention elsewhere. He publicly predicted that China would not possess a single 5th generation aircraft by 2020, whereas the United States would possess 1,100. By 2025, he predicted China would have merely "a handful."[134] Such a prediction would prove wide of the mark: the Chinese J-20 stealth fighter would make its first flight only a year and a half later. Indeed, the test flight occurred while Gates was visiting Beijing, indicating the possibility that it was meant to be a signal about China's growing capabilities.[135]

Today, however, as a result of the trends described in Chapter 3, many of the strategic and operational assumptions that have undergirded U.S. planning in recent years are increasingly open to question or already invalid. In 2014, for example, then Secretary of Defense Chuck Hagel noted, "We are entering an era where American dominance on the seas, in the skies, and in space can no longer be taken for granted."[136] More recently, as the 2018 National Defense Strategy Commission put it:

> The military balance in key regions has been shifting away from the United States and toward major-power competitors. Over the past two decades, while the United States was focused on counter-terrorism and defeating insurgents in Iraq and Afghanistan, Russia and China were focused on acquiring capabilities to overcome America's technological edge and operational reach. As a result, America has been losing its military advantage in a number of key warfighting areas, such as air and missile defense, anti-surface warfare, long-range ground-based fires, and electronic warfare.[137]

133 Robert Gates, "Secretary Gates' Remarks to the Heritage Foundation on 'Next War-itis'," speech, May 13, 2008, http://archive.defense.gov/Speeches/Speech.aspx?SpeechID=1240.

134 Robert Gates, "Remarks by Secretary Gates to the Economic Club of Chicago," speech, July 16, 2009, available at http://archive.defense.gov/Speeches/Speech.aspx?SpeechID=1369.

135 Elisabeth Bumiller and Michael Wines, "Test of Stealth Fighter Clouds Gates Visit to China," *New York Times*, January 11, 2011, available at https://www.nytimes.com/2011/01/12/world/asia/12fighter.html.

136 Quoted in *Ensuring a Strong U.S. Defense for the Future: The National Defense Panel Review of the 2014 Quadrennial Defense Review* (Washington, DC: U.S. Institute of Peace, July 2014), p. 21.

137 National Defense Strategy Commission, *Providing for the Common Defense*, p. 19.

There is, thus, an increasingly urgent need for the U.S. armed forces to develop innovative concepts of operation for great power war in the Indo-Pacific region.

Questionable Strategic Assumptions

The rise of China in general, and Chinese military modernization in particular, is rendering invalid many of the strategic assumptions that shaped U.S. operational planning and force development in recent years.[138]

First, growing ties between Russia and China renders the assumption that ***the United States will face one adversary at a time*** questionable. For many years after the end of the Cold War, the United States pursued a strategy of being prepared to wage two wars at once.[139] This posture was based on several assumptions. First, as a global power, the United States faces threats in multiple theaters that could lead to the use of force. Second, a one-war strategy would leave the United States open to opportunistic actions of aggression in a second theater. Third, and most pragmatically, since 2001 the United States has been fighting wars in Afghanistan and Iraq, as well as against violent extremist organizations worldwide. Above and beyond these requirements, the United States needs the ability to deter, and should it become necessary defeat, aggression by capable powers such as China, Russia, North Korea, and Iran.

Despite the strategic rationale for maintaining a two-war posture, the 2014 Quadrennial Defense Review (QDR) moved to a one-war (or a one-plus-war) strategy.[140] This decision was perpetuated by the 2018 National Defense Strategy (NDS), which called only for the U.S. military to be capable of fighting one war while "deterring opportunistic aggression" in the second theater.[141]

The National Defense Strategy Commission questioned this move:

> In the event of large-scale conflict with Russia or China, the United States may not have sufficient remaining resources to deter other adversaries in one—let alone two—other theaters by denying them the ability to accomplish their objectives without relying on nuclear weapons. The Department's suggested means for addressing multiple contingencies—minimizing involvement in the Middle East, deepening collaboration with allies and partners, and increasing the salience of nuclear weapons—are unlikely to solve the problem.[142]

138 Strategic assumptions have to do with the overall features of a hypothesized contingency. Operational assumptions, discussed below, pertain to characteristics of its campaigns.

139 Gunzinger, Clark, Johnson, and Sloman, *Force Planning for The Era of Great Power Competition*.

140 DoD, *2014 Quadrennial Defense Review* (Washington, DC: DoD, March 2, 2014), available at http://archive.defense.gov/pubs/2014_quadrennial_defense_review.pdf.

141 DoD, *Summary of the 2018 National Defense Strategy of the United States of America* (2018). For a defense of that move, see Jim Mitre, "A Eulogy for the Two-War Construct," *The Washington Quarterly* 41, no. 4, Winter 2019.

142 National Defense Strategy Commission, *Providing for the Common Defense*, p. 15.

Regardless of the formulation, it appears overly optimistic to assume that the United States will have the luxury of facing a single adversary. Rather, it could face circumstances where war breaks out when the United States is already conducting combat operations in another theater. It could also face a coalition of adversaries operating in concert in different theaters.

This suggests the need to expand the capacity of the U.S. armed forces to fight high-end contingencies, to include greater attention to mobilization. It also suggests the need to think seriously about how to deter opportunistic aggression in other theaters while the United States is engaged in one or more conflicts. It also places a premium on forces that can "swing" between multiple theaters or support operations in them from remote locations.

The possibility of multiple, simultaneous threats also calls into question the current division of the globe into geographic combatant commands. The threats that we may face in the future are likely to span multiple geographic combatant commands. Moreover, it suggests a move from the current approach to apportioning forces, which privileges the needs of geographic combatant commands, toward an emphasis on global capabilities, such as strike, ISR, cyber, and logistics, that are not owned by any geographic combatant command but rather can react relatively quickly anywhere in the world.

Second, the assumption that ***the United States will be a sanctuary*** is no longer valid. On the contrary, it should be assumed that China would strike Guam because of its importance to U.S. operations in the Pacific. Indeed, the range of the DF-26 family of missiles appears calibrated to give China just that capability. In addition, Chinese and Russian conventional power-projection capabilities against the continental United States are limited but growing. As noted in Chapter 3, the increasing range of new Chinese bombers and Chinese and Russian air- and submarine-launched cruise missiles can threaten targets in the United States, particularly in Alaska, Hawaii, or near the coasts. The fact that such attacks would likely trigger escalation and the possibility of a nuclear exchange should not lead us to ignore the fact that China and Russia are acquiring such capabilities. More importantly, concerted cyberattacks by either power upon U.S. financial institutions and critical infrastructure such as ports, highways, and power grids can cause massive disruption to the economy in addition to the U.S. military's ability to quickly mobilize and surge forces overseas.

This suggests that greater attention is needed in developing both active and passive defense, as well as building resiliency into U.S. networks. It also suggests the need to assert through declaratory policy the willingness of the United States to respond to attacks on U.S. territory.

Third, the assumption that ***the United States will have assured access to critical facilities and locations on allied and partner territory*** is questionable. Granting the U.S. military access to allied and partner facilities is a political decision, and it is likely that key allies and partners will have to make calculations as to the impact of their actions before committing to support the United States in a future conflict. The growth of Chinese theater strike capabilities discussed in Chapter 3 is aimed, both literally and figuratively, at America's allies in the region. It is meant to make them question the ability of the United States to

defend them, to make the presence of U.S. forces on their territory a liability rather than a benefit, and to give them pause in siding with the United States in a conflict.

This suggests the need to invest in long-range air and mobile maritime strike forces that can be based and employed flexibly in the early stages of a future conflict. While allies are contemplating granting the United States access to their facilities, these forces could defend forward operating bases and have interoperability with allied forces; this would serve to both deter and reassure.

Fourth, the assumption that ***a conflict with China would be a local war confined to a portion of the Western Pacific*** is increasingly questionable. Past assessments often portrayed a potential conflict with China as confined to the Taiwan Strait.[143] However, as Chapter 3 notes, China has for years been acquiring a suite of anti-access/area-denial capabilities of increasing range that will allow the PLA to identify and strike U.S. and allied forces at increasing distances from the Chinese mainland.

Past assessments of a U.S.-China conflict have assumed that U.S. strikes on the Chinese mainland would lead to escalation, potentially to include the use of nuclear weapons.[144] However, the connection between the U.S. ability to strike targets on the Chinese mainland and escalation appears questionable.[145] For example, it appears that an assumption behind China's acquisition of missiles designed to strike U.S. territory (e.g., Guam) such as the DF-26 is the belief that it can do so without facing U.S. nuclear escalation. Moreover, the Chinese posture described in Chapter 3, including China's considerable investment in IADS and UGF, suggests that the Chinese leadership anticipates strikes against mainland targets and does not appear to be relying upon nuclear deterrence to prevent them. As a result, maintaining the U.S. ability to threaten strikes on the Chinese mainland may be a useful way of stimulating further defensive investments in these areas.

China is also pushing its defensive perimeter out by building and then militarizing artificial islands in the South China Sea. Indeed, in the most recent edition of the *Science of Military Strategy*, Chinese military strategists enunciated the need for "an outward extension" of China's "strategic frontier from the coastal and border regions . . . to form an arc-shaped zone

143 See, for example, Robert Ross, "Navigating the Taiwan Strait: Deterrence, Escalation Dominance, and U.S.-China Relations," *International Security* 27, no.2, Fall 2002; David A. Shlapak, David T. Orletsky, and Barry A. Wilson, *Dire Strait? Military Aspects of the China-Taiwan Confrontation of Options for U.S. Policy* (Santa Monica, CA: RAND Corporation, 2000); and Kurt M. Campbell and Derek J. Mitchell, "Crisis in the Taiwan Strait?" *Foreign Affairs* 80, no. 4, July–August 2001.

144 See, for example, Caitlin Talmadge, "Beijing's Nuclear Option: Why a U.S.-Chinese War Could Spiral out of Control," *Foreign Affairs*, November/December 2018; and Joshua Rovner, "Two Kinds of Catastrophe: Nuclear Escalation and Protracted War in Asia," *The Journal of Strategic Studies* 40, no. 5, August 2017, p. 706.

145 For a nuanced view of this topic, see Forrest E. Morgan, Karl P. Mueller, Evan S. Medeiros, Kevin L. Pollpeter, and Roger Cliff, "China's Thinking on Escalation: Evidence from Chinese Military Writings," in *Dangerous Thresholds: Managing Escalation in the 21st Century* (Santa Monica, CA: RAND Corporation, 2008), pp. 47–82, available at http://www.jstor.org/stable/10.7249/mg614af.10.

covering the limited areas of the Western Pacific and northern Indian Ocean.[146] Portions of this arc could include Chinese forces operating from air and naval bases along the Indian Ocean littoral—such as Djibouti and Pakistan—and perhaps even from islands in the South Pacific. As a result, it is increasingly unlikely that a future clash with China would occur in as narrow a geographic setting as was previously assumed. In addition, there is the ongoing reality of Chinese cyberattacks on the United States, its allies, and interests worldwide.

Chinese interests extend far beyond Asia, and increasingly the PLA operates beyond the region. The PLAN routinely deploys to the Arabian Gulf and the Horn of Africa, and China has established a base in Djibouti, which it could do so elsewhere as well. As China's interests in Africa and Central Asia grow, so too could its military presence. As a result, it appears increasingly unrealistic to equate a conflict with China to a conflict in the Western Pacific. As the NDS Commission made clear, "The United States and its allies must increasingly account for Chinese and Russian activities and power-projection capabilities beyond their home regions. Major-power competition is a global challenge, not simply a regional one."[147]

This suggests that the United States will not be able to concentrate forces to the extent previously believed, calling for greater overall capacity. Moreover, the fact that rear areas and lines of communication may not be safe suggests that purpose-built escort and security forces may be needed. There may also be opportunities to employ forces that are less capable of operating in high-threat environments in peripheral theaters.

Fifth, the assumption that ***a conflict with China would necessarily be short*** is questionable. Past assessments often portrayed a conflict with China as a "short, sharp war" that would be over in a matter of days.[148] Under some circumstances, this could prove to be correct. It is, of course, possible that the United States and its allies could achieve a quick, decisive victory over China. Conversely, if the Chinese are able to achieve strategic and operational surprise, the modernized Chinese forces described in Chapter 3 could yield Beijing a quick, decisive victory. However, it is also possible that a war with China could become protracted. In particular, the growth and spread of precision-strike systems, to include China's large-scale investment in them, appears to herald an era of protracted war, since these weapons allow states like China to deny the United States the theater buildup it needs to achieve quick and decisive victory.[149] Moreover, as Joshua Rovner has argued, the possibility of nuclear escala-

146 寿晓松 [Shou Xiaosong], 战略学 [Science of Military Strategy] (Beijing: Academy of Military Science Press, 2013), pp. 106–107.

147 National Defense Strategy Commission, *Providing for the Common Defense*, p. 19.

148 David C. Gompert, Astrid Stuth Cevallos, and Cristina L. Garafola, *War with China: Thinking Through the Unthinkable* (Santa Monica, CA: RAND Corporation, 2016), available at https://www.rand.org/content/dam/rand/pubs/research_reports/RR1100/RR1140/RAND_RR1140.pdf.

149 See, for example, Thomas G. Mahnken, "Weapons: The Growth & Spread of the Precision-Strike Regime," *Daedalus* 140, no. 3, Summer 2011; Andrew F. Krepinevich, *Why AirSea Battle?* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010); and Gunzinger, Clark, Johnson, and Sloman, *Force Planning for The Era of Great Power Competition*.

tion in a Sino-American conflict could similarly yield a protracted war, since steps taken to mitigate the risk of nuclear escalation perversely reduce the incentive for the other party to come to the table without first gaining a decisive conventional advantage. Rovner has also argued that Chinese industry can sustain the level of arms production necessary to replace those systems lost to attrition in a protracted war, especially if the U.S. decides not to strike targets on the Chinese mainland.[150]

In a protracted war, other dimensions of power may become increasingly important, to include the ability to mobilize technological and societal resources; gather and support allies and partners; and open up new geographic or functional theaters of operations. Furthermore, in a protracted war the economic dimension comes to the fore, with the economic weight of the belligerents and their access to strategic resources playing an important role. This suggests a very different set of planning considerations than those that have governed force structure and operational planning since the end of the Cold War.

A sixth, related assumption, that ***a war with China would have a clear beginning and end***, appears similarly questionable. In the South China Sea, East China Sea, and elsewhere, the Chinese government has embarked upon campaigns that appear to be designed to yield territorial objectives without triggering the use of force in response.[151] In addition, the Chinese Communist Party today is actively waging political warfare against the United States, its allies, and others.[152]

If the opening of a future conflict may not be clearly defined, a future war may not come to a clear end either. One can envision a situation where the United States and its allies achieve operational success without achieving victory. The Chinese leadership has shown a propensity to back down when confronted, but to do so in a way that allows it to retain the option of re-kindling a conflict in the future. For example, one can imagine a contingency where the Chinese leadership elects to use force, against Taiwan for example, only to have the fighting subside but not really end. Thus, even if the United States and its allies do not face a protracted war per se, they may be faced with the need to be ready to act over a long time period. This suggests the further need to develop concepts and capabilities for protracted war.

Questionable Operational Assumptions

Since the end of the Cold War and the 1991 Gulf War, the United States has pursued a national military strategy based on forward-stationed forces backed by power projection. During that same period, however, China and Russia developed a suite of capabilities and concepts to defeat the U.S. strategy. As a result, as the report of the National Defense Strategy Commission put it, today,

150 Rovner, "Two Kinds of Catastrophe."

151 Clark, Gunzinger, and Sloman, *Winning in the Gray Zone*.

152 Thomas G. Mahnken, Ross Babbage, and Toshi Yoshihara, *Countering Comprehensive Coercion: Competitive Strategies Against Authoritarian Political Warfare* (Washington, DC: Center for Strategic and Budgetary Assessments, 2018).

> If the United States had to fight Russia in a Baltic contingency or China in a war over Taiwan . . . Americans could face a decisive military defeat. These two nations possess precision-strike capabilities, integrated air defenses, cruise and ballistic missiles, advanced cyberwarfare and anti-satellite capabilities, significant air and naval forces, and nuclear weapons—a suite of advanced capabilities heretofore possessed only by the United States. The U.S. military would face daunting challenges in establishing air superiority or sea control and retaking territory lost early in a conflict. Against an enemy equipped with advanced anti-access/area-denial capabilities, attrition of U.S. capital assets—ships, planes, tanks—could be enormous. The prolonged, deliberate buildup of overwhelming force in theater that has traditionally been the hallmark of American expeditionary warfare would be vastly more difficult and costly, if it were possible at all.[153]

First, the assumption that ***the United States and its allies will be able to achieve air superiority operating from land and sea bases*** is no longer valid. The U.S. armed forces have not faced an adversary equipped with an advanced integrated air defense system (IADS) since the 1999 Kosovo War. By contrast, they have grown accustomed to uncontested air dominance. However, as described in Chapter 3, China today possesses sophisticated IADS consisting of advanced radars, modern long-range SAM systems, and advanced fighter aircraft that are far more capable than those faced in 1999 and, in its entirety, arguably more capable than any air defense system faced since World War II. China is also extending its early warning network and IADS through its construction and militarization of artificial features in the South China Sea. China and Russia are also investing in technologies aimed at identifying and tracking low-observable aircraft.[154] As a result, U.S. and allied air forces can no longer take for granted their ability to penetrate the airspace of the Western Pacific, let alone the Chinese homeland. Aircraft that are not designed or intended to penetrate or operate in defended airspace, including key enablers such as tanker and AWACS aircraft, as well as long-range weapon launch platforms, may be forced to "stand off" so far from enemy territory that they are no longer capable of carrying out their missions. This suggests the need to rebalance U.S. air forces toward platforms that can survive and fight in contested and highly contested environments, as well as the need to invest in effective and yet low-cost, attritable combat systems to multiply the effectiveness of U.S. forces.

The United States has traditionally relied upon land-based theater aircraft for the bulk of its offensive and defensive air capability. However, the PLA has fielded large numbers of conventionally armed precision-guided ballistic and cruise missiles designed to strike fixed targets such as airbases. As a result, it is likely that PLA missile attacks would put out of action or

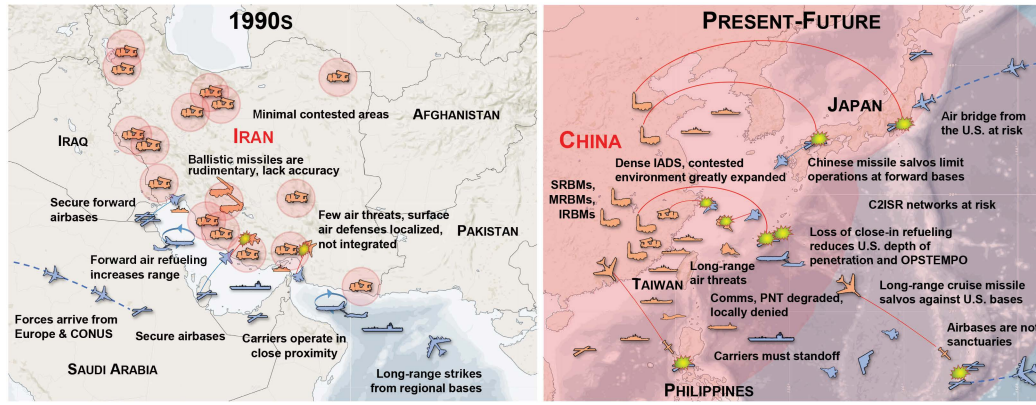
153 National Defense Strategy Commission, *Providing for the Common Defense*, p. 10.

154 Liu Zhen, "China's Latest Quantum Radar Won't Just Track Stealth Bombers, but Ballistic Missiles in Space Too," *South China Morning Post*, June 15, 2018, available at https://www.scmp.com/news/china/diplomacy-defence/article/2151086/chinas-latest-quantum-radar-wont-just-track-stealth; and Dave Majumdar, "Chinese and Russian Radars on Track to See Through U.S. Stealth," *USNI News*, July 30, 2014, available at https://news.usni.org/2014/07/29/chinese-russian-radars-track-see-u-s-stealth.

destroy most key facilities within the first few hours of a war, and follow-on attacks would prevent base recovery for weeks afterward.[155]

In addition to threatening U.S. and allied air bases, the PLAAF appears to be developing forces and concepts of operations to target U.S. tankers, airborne warning and control systems (AWACS), and other key airborne enablers. They appear to understand how critical these aircraft are to our preferred approach to air operations, as well as how their loss would decrease their effectiveness. Indeed, threats to bases and airborne enablers have a synergistic effect: threats to air bases force the United States into a greater reliance on tankers deployed at fewer and more distant tanker bases and lower fuel offload; threats to them could lead to systemic failure of the traditional U.S. approach to air power projection.

FIGURE 11: PAST ASSUMPTIONS AND CURRENT CHALLENGES TO U.S. AIR POWER



The PLA's investment in long-range surveillance assets and land-, air-, and submarine-launched weaponry means that U.S. carrier strike groups (CSG) and other surface vessels are becoming increasingly vulnerable. To reduce the threat to a CSG to a manageable level while maximizing their offensive air operations, it will need to operate from a distance of 800–1,200 nm from its target. Absent a very different carrier air wing and innovative operational concepts, the U.S. Navy will have a greatly reduced ability to conduct strike operations in the Western Pacific.[156]

With theater land- and sea-based aircraft increasingly vulnerable, the United States will be left to rely upon its submarine force for power projection. However, as noted in Chapter 3, China is increasing its ASW capability. Moreover, the strike capacity of the U.S. submarine force is but a fraction of land- and sea-based theater aircraft strike capacity.

155 See, for example, Gompert, Cevallos, and Garafola, *War with China*; and Jan van Tol et al., *AirSea Battle: A Point-of-Departure Operational Concept* (Washington, DC: Center for Strategic and Budgetary Assessments, 2010), pp. 24–25.

156 See, for example, Bryan Clark, Adam Lemon, Peter Haynes, Kyle Libby, and Gillian Evans, *Regaining the High Ground at Sea: Transforming the U.S. Navy's Carrier Air Wing for Great Power Competition* (Washington, DC: Center for Strategic and Budgetary Assessments, 2018), p. iv.

Second, the assumption that ***the United States will enjoy an operational sanctuary in space*** is no longer valid. Since the end of the Cold War, the United States has grown used to the uncontested use of space. However, as documented in Chapter 3, the PLA is actively engaged in programs to degrade or destroy U.S. space assets. As a result, absent the development of innovative operational concepts and capability, the United States could find itself without the space-based communications, ISR, and PNT systems that are critical to the effectiveness of U.S. and allied military operations. As a result, the United States needs to explore a more resilient space architecture, as well as alternatives to space-based services such as the use of UAS for communications, ISR, and PNT.

Third, the assumption that ***U.S. information networks will remain secure*** is invalid. Secure classified and unclassified information networks, to include command and control; intelligence, surveillance, and reconnaissance; and targeting systems, are central to existing U.S. concepts of operations. China is working hard to develop cyber and other capabilities to challenge, penetrate, or degrade a wide range of defense, national security, and logistics networks that would play key roles in any future crisis in the Western Pacific. This suggests the need for more resilient and diversified networks to support operations, as well as the ability to conduct command, control, and communications (C3) in denied environments.

Fourth, the assumption that ***the United States will be able to resupply its forces*** in the event of a high-intensity war is questionable. The United States relies on a system of a few, centralized logistics and refueling hubs that, while economical in peacetime, make for highly vulnerable and tempting targets in a time of war. The U.S. maritime logistics fleet has shrunk considerably since the end of the Cold War and is increasingly incapable of meeting present needs, much less serve in a protracted war where attrition is inevitable. The destruction of any of these hubs or the loss of even a few of these ships could seriously limit U.S. ability to sustain a protracted war. The same is true of airborne logistics, which are as vulnerable, if not more so, given threats to aircraft and major operating bases. As CSBA has concluded through multiple exercises, wargames, and studies, this suggests the development of new logistical concepts suited to high-intensity operations.[157]

157 See, for example, Timothy A. Walton, Ryan Boone, and Harrison Schramm, *Sustaining the Fight: Resilient Maritime Logistics for a New Era* (Washington, DC: Center for Strategic and Budgetary Assessments, 2019 [forthcoming]).

CHAPTER 5

The Need for Innovative Operational Concepts to Meet Emerging Challenges

The strategic and operational assumptions that have undergirded U.S. force planning since the end of the Cold War are now increasingly questionable or already invalid due to the emergence of a set of operational challenges that demand the accelerated fielding of new capabilities and innovative concepts for employing them. The forces we currently possess were developed under the old assumptions and are different from those we are likely to need for the new reality. This chapter highlights those challenges and proposes a set of experiments to develop new operational concepts, organizations, and capabilities. These experiments, and the concepts they yield, should, in turn, inform major shifts in investment and divestment in U.S. force structure.

Operational challenges play a crucial role in military innovation. Historically, most large-scale innovations have come about because of the perception of an operational or strategic problem that defied a conventional solution. As discussed in Chapter 2, for example, the need to defend U.S. territories in the Western Pacific in the face of a growing threat from Imperial Japan drove the Navy and Marine Corps to develop carrier aviation, amphibious warfare, and expeditionary logistics. The urgency of action and the absence of incremental, routine alternatives is often necessary to break the strong preference of existing bureaucracies to apply their preferred solutions to the problem. Indeed, innovation is often an unnatural act for organizations that are, by their very nature, meant to routinize rather than innovate.

The United States and its allies face a severe set of operational challenges. The 2001 Quadrennial Defense Review, which was issued in the wake of the September 11, 2001 terrorist attacks, contained a list of operational challenges that were meant to drive investment, including the need to protect critical bases of operations, defeat anti-access/area-denial

threats, and enhance the survivability of space systems.[158] Although DoD has launched various initiatives to address these challenges, the U.S. position has eroded in most, if not all, of these areas, and in some cases markedly.

To achieve and maintain a favorable military balance for the United States and its allies against China in the Indo-Pacific region and Russia in Europe, the 2018 National Defense Strategy Commission recommended that DoD focus its investments on dealing with the following operational challenges:

- Protecting critical bases of operations, including the U.S. homeland, forces abroad, and allies and partners;
- Rapidly reinforcing and sustaining forces engaged forward;
- Assuring information systems in the face of attack and conducting effective information operations;
- Projecting and sustaining U.S. forces in distant anti-access or area-denial environments and defeating anti-access and area-denial threats;
- Deterring and, if necessary, defeating the use of nuclear or other strategic weapons in ways that would fall short of justifying a large-scale nuclear response;
- Enhancing the capability and survivability of space systems and supporting infrastructure; and
- Leveraging information technology and innovative concepts to develop an interoperable, joint C4ISR architecture and capability that supports the warfare of the future.[159]

Developing innovative operational concepts and fielding new organizations and capabilities to overcome these challenges should become the urgent focus of Defense Department investment. In an era of constrained resources, those concepts and capabilities that offer the greatest strategic and operational leverage should receive preferential funding over those that do not.

The Services have accumulated, at best, a mixed record in developing innovative operational concepts. On the one hand, the development of AirLand Battle doctrine by the Army and Air Force in the 1980s was a success.[160] On the other hand, the organizational culture of the Services also inhibits innovation, particularly those changes that call into question existing communities or threaten to create new, competing communities within them. For example, the Navy's limited interest in extending the range and effectiveness of their carrier air wing

158 DoD, *2001 Quadrennial Defense Review Report* (Washington, DC: DoD, 2001), p. 30.

159 National Defense Strategy Commission, *Providing for the Common Defense*, p. 15.

160 John L. Romjue, *From Active Defense to AirLand Battle: The Development of Army Doctrine, 1973–1982* (Ft. Leavenworth, KS: U.S. Army Training and Doctrine Command, 1984).

with unmanned strike systems demonstrates that Services can often be reluctant to innovate on their own. The Navy took an early interest in developing stealthy unmanned carrier-based long-range strike systems in recognition of the challenges described above, only to back away from the mission and the requirement for stealth. As a result, the Navy has made little progress in addressing threats to the survivability and utility of its carriers that were evident almost two decades ago. There is thus a need to provide incentives to promote innovation and strong executive and legislative branch oversight of such activities.

The Office of the Secretary of Defense and the Joint Staff should lead the development of joint operational concepts. These should include both efforts to use existing capabilities in new and innovative ways as well as ones to craft roles for truly new capabilities. As part of this effort, DoD should use mechanisms such as the Warfighting Lab Incentive Fund to sponsor a program of operationally realistic experiments and demonstrations to test out these new concepts, much as the Navy and Marine Corps conducted during the 1920s and 1930s to develop carrier aviation and amphibious doctrine.[161]

To evaluate candidate concepts and capabilities, the Defense Department should adopt a set of criteria for the innovative concepts and capabilities that it develops, including:

- Options: New concepts and capabilities should yield an expanded set of options for the United States and its allies, and they should constrain the options available to competitors such as China.
- Cost Imposition: New concepts and capabilities should put the United States and its allies on the right side of the cost equation. They should allow us to impose costs on competitors such as China while preventing our competitors from imposing costs on us.
- Initiative: New concepts and capabilities should give us initiative in the military competition with great power competitors such as China, forcing them to respond to us.

Congress has historically played an important role in promoting innovation, such as its advocacy of unmanned systems over the years. Today as well, Congress can spark the development of innovative operational concepts by requiring and funding experiments and demonstrations, as well as by demanding realistic assessments of them.

Potential Operational Concept Experimentation Initiatives

Much as the U.S. armed forces of the early 20th century conducted experiments that yielded concepts for carrier air warfare, amphibious operations, and expeditionary logistics, the Defense Department should today craft a program of experimentation to develop new operational concepts and capabilities aimed at meeting the threats described above. Such a program could include the following:

161 Robert O. Work, "Warfighting Lab Incentive Fund and Governance Structure," Memorandum for the Director, Cost Assessment and Program Evaluation, Office of the Deputy Secretary of Defense, May 6, 2016, available at https://defenseinnovationmarketplace.dtic.mil/wp-content/uploads/2018/02/DSD_memo.pdf.

Neutralizing Anti-Access/Area-Denial Threats through Long-Range, Multi-Dimensional Strike. As noted above, the development of so-called anti-access/area-denial capabilities by China poses a major threat to U.S. interests in the Western Pacific. Projecting and sustaining U.S. forces in the face of such A2/AD threats should be a major thrust of experimentation. Several subordinate efforts appear particularly promising.

First, the U.S. government purchased two stealthy X-47B UAS technology demonstrator aircraft before terminating the program. DoD could use the aircraft to develop innovative concepts of operations for land- and sea-based unmanned stealth systems, to include the value of autonomy as well as the use of innovative logistical concepts to extend their range.

FIGURE 12: X-47B UAS LAUNCHING FROM DECK OF USS GEORGE H.W. BUSH

U.S. Navy photo.

Aircraft similar to the X-47B could have superior range, endurance, payload, and stealth relative to manned aircraft, enabling them to address several of the operational challenges described in Chapter 3, potentially offsetting China's past investment in A2/AD capabilities and imposing new costs upon it. For example, DoD could develop concepts to conduct strike operations at extended ranges using long-endurance unmanned vehicles. Employing UAS in this manner could reduce the U.S. reliance upon vulnerable bases and tankers in theater, and provide it with a capability to locate and strike elusive targets inside defended airspace, a key priority established in the *National Defense Strategy*.

Second, the Navy is procuring three DDG-1000 *Zumwalt*-class surface vessels. The attributes of these ships, to include their stealth, large displacement, and electric propulsion, make them both unique as surface combatants as well as potentially valuable assets for experimentation. The U.S. Navy is, for example, pursuing the creation of an experimental squadron containing

the three *Zumwalt*-class destroyers to undertake an aggressive program of experimentation.[162] The Defense Department could use the ships to develop concepts of operations for operating within range of an adversary's A2/AD capabilities. Specifically, they could be used to determine the value of stealth surface combatants for conducting anti-air, anti-surface, and strike warfare in denied environments.

Third, DoD is currently procuring a new Long-Range Anti-Ship Missile (LRASM), which should provide a highly capable weapon against enemy ships. However, current plans call for the missile to be carried by three aircraft, the B-1B, the F/A-18E/F, and the F-35. These aircraft will be increasingly challenged to operate in the Western Pacific due to growing threats to aircraft, tankers, and bases in that region. Accordingly, the Defense Department should develop concepts to integrate LRASM onto the B-2 stealth bomber, which has the range and survivability that may be needed to reach Chinese or Russian target sets in defended waters. The B-2 is already integrating the JASSM-ER missile on which the LRASM is based and has a capable AESA radar system with a maritime mode that has, so far, gone unused. Although anti-surface warfare would be a new mission for the B-2, it would be a return to form for an Air Force bomber community that played important maritime roles during World War II and the Cold War.

Integrating LRASM onto the B-2 could give the United States the capability to hold at risk enemy surface combatants and other high-value maritime targets in highly contested environments that other anti-surface warfare platforms may be increasingly challenged to reach. Doing so would help mitigate the threats to U.S. carriers and surface ships, free up submarines for other missions, and reduce the need for vulnerable bases and tankers. Given the significant cost, military utility, and symbolic value of China's growing surface fleet, the threat that it could be destroyed promptly and without warning in any conflict scenario could prove a powerful deterrent. A demonstration of the B-2's maritime strike capability could send a clear signal of the U.S. intent and ability to hold at risk all enemy ships in any conflict.[163] Should the concept prove successful, LRASM could subsequently be integrated onto the forthcoming B-21 bomber, which should be available in greater numbers than the B-2 for missions such as maritime strike.

Experiments such as these can yield insight into the capabilities and concepts that the U.S. armed forces should pursue to project and sustain forward presence in A2/AD environments, and defeat A2/AD threats if necessary. Ultimately, these concepts should trigger future investment and divestment decisions.

162 Megan Eckstein, "Navy Pursuing 'Surface Development Squadron' to Experiment with Zumwalt DDGs, Unmanned Ships," *USNI News*, January 28, 2019, available at https://news.usni.org/2019/01/28/navy-still-pursuing-surface-development-squadron-experiment-zumwalt-ddgs-unmanned-ships.

163 See, for example, the discussion of Operation Resultant Fury at www.ussschenectadylst1185.org/3-ResultantFury.htm

Creating Anti-Access/Area-Denial Challenges for Competitors. Just as the United States has been forced to confront A2/AD capabilities, the U.S. armed forces should explore ways to employ such capabilities against competitors. Each of the Services is developing capabilities that could be used to create anti-access challenges for competitors. The Army and Marine Corps are both exploring the deployment of land-based anti-ship missiles such as LRASM, the Naval Strike Missile, and the Maritime Strike Tomahawk; the Navy is modernizing its anti-ship and land-attack capabilities; and, as described above, the Air Force plans to equip some of its aircraft with anti-ship missiles. Deployed in the First and Second Island Chains, such capabilities could reassure allies and deter China from committing aggression. During the 2018 Rim of the Pacific (RIMPAC) exercise, for example, U.S., Japanese, and Australian forces used aircraft, a submarine, and land assets to sink a decommissioned U.S. Landing Ship Tank (LST) off Hawaii.[164] Further experiments and demonstrations could yield innovative operational concepts for linking U.S. and allied forward-based and expeditionary land-based precision strike systems with sea-based munitions and tactical aircraft. Such experiments could yield new concepts for projecting and sustaining forces in A2/AD environments as well as reinforcing and sustaining forward engaged forces.

FIGURE 13: U.S. ARMY VEHICLE FIRES NAVAL STRIKE MISSILE AT RIMPAC 2018

U.S. Army photo.

Protecting Critical Bases of Operations Against Salvo Attacks. As described throughout this report, U.S. and allied bases are under increasing risk from large-scale ballistic and cruise missiles, in addition to unmanned aerial vehicle (UAV) attack. Protecting critical bases of operations against such salvo attacks is a critical operational challenge. As

164 Commander, U.S. 3rd Fleet, "RIMPAC Units Participate in Sinking Exercise," *DVIDS News*, July 12, 2018, available at https://www.dvidshub.net/news/284223/rimpac-units-participate-sinking-exercise.

CSBA has previously suggested, the United States should develop innovative operational concepts for defending those bases. Such defenses could include medium-range high-energy lasers (HEL), high-power microwave (HPM) systems, guided projectiles launched by rapid-firing guns, and low-cost surface-to-air missiles. Unmanned and manned aircraft carrying extended-range air-to-air missiles and equipped with wide-area surveillance sensors, HELs, and possibly HPM systems could further extend the range and increase the threat engagement capacity of a base salvo defense complex.[165]

Establishing Survivable C4ISR Networks. The need to develop operational concepts to establish C4ISR networks in the face of adversary threats is a critical operational challenge. As noted above, states such as China are fielding an increasing variety of counterspace capabilities. The Defense Department should develop innovative operational concepts and business practices to allow it to rapidly develop new space capabilities and launch them on relatively short notice. Such an approach could include not just the development of innovative practices, but also relationships with the civilian space industry. It should also explore alternatives to space for services such as communications, ISR, and PNT. For example, DoD should experiment with the use of UAS to provide communications, ISR, and PNT in a space-denied environment. Indeed, UAS may be able to provide these capabilities at much lower cost than launching new satellites. Such initiatives would yield insight into the concepts and technologies needed to enhance the capability and survivability of space systems and the services they provide, as well as new ways to leverage interoperable joint C4ISR in the face of adversary threats.

In each of the above cases, relatively modest investments of money coupled with systems that have already been procured (e.g., the X-47B and DDG-1000) or are already being procured (e.g., LRASM, Naval Strike Missile) could reap disproportionate rewards. Success will, however, require a tolerance for risk and failure as well as a desire to break out of a bureaucratic mindset that prizes slow, methodical research, development, and acquisition over rapid capability development.

Conclusion

The development of new concepts and the conclusion of experiments are not ends in and of themselves. Too often, Department of Defense experiments have been side projects; they create a façade of innovation without actually making substantial impact on doctrine, organization, force structure, or investment plans. Future concept development and experimentation must be designed and implemented to directly inform force planning and investment decisions. As established in chapter 4, the assumptions under which the vast majority of existing U.S. forces and capabilities were developed are in many cases highly questionable or clearly

165 Gunzinger and Rehberg, *Air and Missile Defense at a Crossroads*.

invalid. This is also true of numerous ongoing Defense Department acquisition programs, many of which were begun over a decade ago.

As a result, the forces and capabilities we have today—and are currently procuring—are in many cases out of alignment with the world of 2020 and beyond. Substantial shifts in Defense Department investment and force structure will be needed to better align the Joint Force with the strategic and operational challenges we face today and will face in the future. The objective of concept development and experimentation must be to inform major shifts in investment and force structure toward forces and capabilities that can mitigate the challenges we face and impose challenges upon our competitors. We know we need changes in direction; concept development and experimentation should show us in which direction we should go.

LIST OF ACRONYMS

A2/AD	anti-access/area denial
AESA	active electronically scanned array
AEW&C	airborne early warning and control
ALBM	air-launched ballistic missile
ALCM	air-launched cruise missile
ASAT	anti-satellite
ASBM	anti-ship ballistic missile
ASCM	anti-ship cruise missile
ASuW	anti-surface warfare
ASW	anti-submarine warfare
AWACS	Airborne Warning and Control System
BRI	Belt and Road Initiative
C2	command and control
C3	command, control, and communications
C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CCG	China Coast Guard
CCP	Chinese Communist Party
COIN	counterinsurgency
CONUS	continental United States
CSG	carrier strike group
CT	counterterrorism
DDG	guided-missile destroyer
DIA	Defense Intelligence Agency
EMS	electromagnetic spectrum
EW	electronic warfare
FFG	guided-missile frigate
GEO	geosynchronous orbit
GLCM	ground-launched cruise missile
GPS	Global Positioning System
HEL	high-energy laser
HPM	high-power microwave
IADS	integrated air defense system
ICBM	intercontinental ballistic missile
IJN	Imperial Japanese Navy
IRBM	intermediate-range ballistic missile
ISR	intelligence, surveillance, and reconnaissance
JASSM-ER	Joint Air-to-Surface Standoff Missile
LACM	land attack cruise missile

LEO	low-earth orbit
LRASM	Long-Range Anti-Ship Missile
LST	Landing Ship Tank
MaRV	maneuverable reentry vehicle
MIRV	multiple independent reentry vehicles
MRAP	Mine-Resistant Ambush Protected
MRBM	medium-range ballistic missile
NDS	National Defense Strategy
NSIB	National Security Innovation Base
OTH	over-the-horizon
PAFMM	People's Armed Force Maritime Militia
PAP	People's Armed Police
PLA	People's Liberation Army
PLAAF	People's Liberation Army Air Force
PLAGF	People's Liberation Army Ground Force
PLAN	People's Liberation Army Navy
PLARF	People's Liberation Army Rocket Force
PLASSF	People's Liberation Army Strategic Support Force
PNT	position, navigation, and timing
QDR	Quadrennial Defense Review
R&D	research and development
RIMPAC	Rim of the Pacific
SAM	surface-to-air missile
SAR	synthetic aperture radar
SATCOM	satellite communication
SLBM	submarine-launched ballistic missile
SOF	special operations forces
SRBM	short-range ballistic missile
SSBN	nuclear ballistic missile submarine
SSGN	guided-missile nuclear attack submarine
SSK	diesel-electric submarine
SSN	nuclear attack submarine
THAAD	Terminal High-Altitude Area Defense
UAS	unmanned aerial system
UAV	unmanned aerial vehicle
UGF	underground facilities
USV	unmanned surface vessel
UUV	unmanned underwater vehicle

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