THE ARSENAL OF DEMOCRACY

TECHNOLOGY, INDUSTRY, AND DETERRENCE IN AN AGE OF HARD CHOICES

EYCK FREYMANN
HARRY HALEM

FOREWORD BY ADMIRAL JAMES O. ELLIS JR., USN (RET.), AND NIALL FERGUSON

INTRODUCTION

Two drones hover quietly above a field in eastern Ukraine, 10 kilometers west of the front line. High above, an Orlan-10 reconnaissance drone captures and transmits real-time imagery to a Russian command center. It is tracking the telltale shapes of two Ukrainian artillery pieces, tucked beneath camouflage nets. The Russian officer gives the order, and below, a Lancet drone loitering nearby zeroes in on its target, its X-shaped wings allowing for precise maneuvering. Guided by the Orlan, the drone noses down, accelerating to over 300 kilometers per hour. It pierces the netting and the explosive payload beneath detonates on impact.

Warfare is in the midst of a technological transformation. In some respects, the images from the trenches in eastern Ukraine recall the horrors of World War I. But in other respects, this war is like no other in history. As a result of drones, satellite communications, precision munitions, and other new capabilities, targets that can be spotted by the enemy are often destroyed within minutes, even many kilometers behind the front line. In response to this new situation, the Russian and Ukrainian armed forces have had to adapt. They have adopted new models for logistics and resupply and changed the way units maneuver. They have repurposed existing capabilities for spotting and

strike and invested in countermeasures such as air defenses, decoys, and electronic warfare (EW). The battlefield in Ukraine has become a sandbox of innovation. Whichever side has enjoyed the adaptive advantage at any given time has been able to impose asymmetric costs on the other. Artillery shells cost several thousand dollars each; the cheapest first-person view (FPV) drones cost just a few hundred. At the same time, the war has shown that attrition still matters. Ukraine is testing next-generation drones, which it claims will be operated almost entirely by artificial intelligence.[1] Even so, the People's Republic of China (PRC), Russia, and Iran are also advancing in drone technology—and together they enjoy a significant advantage in industrial capacity.

As this book goes to press in summer 2025, we do not know how the Russia-Ukraine war will end—or what lessons Xi Jinping and the People's Liberation Army (PLA) are learning from it—but it is already clear that the pace of innovation in defense technology is accelerating. For the last seven decades, the United States has deterred conflict with other great powers through the combination of nuclear weapons and a dominant conventional force. To preserve deterrence against them and other hostile powers over the next decade and beyond, the United States will have to both modernize its force and find innovative ways to integrate new technologies with existing platforms. The US military cannot view emerging capabilities merely as replacements for legacy systems. Rather, it must leverage new technologies to enhance the effectiveness of proven platforms, creating additional margins of advantage through their combination. To avoid being drawn into a war with a great-power rival, the United States must demonstrate not only technological superiority in specific capabilities but also the capacity to keep adapting its armed forces and defense industrial base (DIB) to be able to prevail in a protracted, high-intensity conflict.

As we write these words, the risk of great-power conflict seems higher than at any point in decades, and US military power is spread worryingly thin. The North Atlantic Treaty Organization (NATO) is helping Ukraine defend itself against Russia's unprovoked war of

aggression. The Middle East is a tinderbox, with Iran on the verge of acquiring nuclear weapons. China is menacing Taiwan and ramping up maritime aggression against the Philippines. North Korea continues to expand its nuclear arsenal and is developing advanced ballistic missiles.

Worse, the four hostile authoritarian powers are increasingly operating as an axis. The regimes in China, Russia, North Korea, and Iran have different domestic conditions and foreign policy priorities, but they share a common interest in undermining US leadership and building a new world order safe for authoritarianism. They are sharing advanced defense technologies and selling each other large quantities of lower-end systems, in what amounts to the construction of an integrated DIB.[2] North Korean troops are fighting alongside Russians in Ukraine. As all four countries shift from dollar payment networks to Chinese cross-border payment systems, they are also building resilience to sanctions, which will make it harder for US policy to stop them from cooperating in the future.[3] Above all, the more the four adversaries deepen their cooperation, the greater the possibility that conflict in one region could spread to others.[4]

The deterrence challenge is greatest in the Indo-Pacific, the world's most populous, fast-growing, and economically important region. Here, unlike in Europe, there is no NATO-equivalent organization to support US efforts to maintain peace and stability. Instead, the United States has a "hub-and-spoke" network of allies and partners that it formulated long before China emerged as a major military power. Whereas the adversary America faces in Europe is a declining power, the one it faces in the Indo-Pacific is still rising. Among many superlatives, drawing on the largest industrial base in human history, China already has the world's largest active-duty military force, ground forces, navy, other maritime forces, and overall conventional ballistic and cruise missile forces—including a suite of military capabilities specifically designed to hold US forces at risk.[5] Of course, although China is the pacing threat, the US military must also remain agile enough to address threats worldwide—especially in regions like the

Middle East, where day-to-day operational demands can force hard trade-offs in resource allocation and readiness.

The most dangerous and likely trigger for a US-China conflict is a Taiwan contingency. Many Taiwan crisis scenarios can be imagined. They range from a formal blockade with warships to a quarantine with coast guard ships, to a smaller attack on the outlying islands of Kinmen and Matsu, to a full-scale invasion and war with the United States. China may pursue any of these strategies in combination or in sequence. The United States must prepare for all of them. In blockade and quarantine contingencies, lawfare and economic coercion might matter as much as air-naval power. Still, if Xi uses brinkmanship to test US and Taiwanese resolve, clever diplomatic strategies and economic threats will not be effective substitutes for robust military deterrence.

Beijing would obviously prefer to take Taiwan without general war with the United States, but Xi is also openly preparing to fight such a war. "We must adhere to bottom-line thinking and worst-case-scenario thinking (极限思维)," Xi told the National Security Commission in a May 2023 meeting. China's ship of state must be ready to withstand "high winds, choppy waters, and even dangerous storms."[6] According to CIA Director William Burns, Xi has ordered the PLA to be ready to forcibly seize Taiwan by 2027.[7] China is actively stockpiling the raw materials it would need to fight a prolonged general war.[8] If the United States and China ever go to the brink over Taiwan, whichever side is better positioned to win an outright confrontation will enjoy escalation dominance—and may be able to achieve its political goals without fighting.

Deterring a conflict with China over Taiwan must therefore be the United States' top strategic priority. In 1950, General Douglas MacArthur likened Taiwan to an "unsinkable aircraft carrier" for projecting military power in the maritime space around Japan, the Philippines, the South China Sea, and the broader Western Pacific.[9] If Taiwan were to fall, US ability to defend regional allies such as Japan and the Philippines from future attacks would be severely compromised,

degrading the credibility of US security assurances. Smaller countries in the region, especially in Southeast Asia, would likely submit to Beijing's de facto regional hegemony. Moreover, economic globalization has made Taiwan important for reasons that MacArthur could not have imagined seventy years ago.[10] A conflict over Taiwan could lead to the destruction of Taiwan's semiconductor industry, setting back the global economy by years. If China seized Taiwan's chipmaking facilities ("fabs") intact, it might starve the United States and its allies of computation power and seize the commanding heights of artificial intelligence (AI) technology. A conflict over Taiwan would also recast economic and trade relationships in the region and beyond. Depending on how the United States responded, the rules-based trading system might collapse, or China might co-opt the system for its own benefit.[11] These outcomes would make it far harder to ensure prosperity for future generations of Americans. They emphasize the importance of deterring the conflict from breaking out in the first place.

To maintain military deterrence over China for the next decade and beyond, the US military must make Beijing believe that an invasion of Taiwan or a US treaty ally would be likely to fail and that non-invasion attacks on a US treaty ally would not be worth it, either. In the Taiwan invasion scenario, there would likely be a clear division of labor between Taiwan and its external defenders.[12] Taiwan would take primary responsibility for defeating an amphibious and aerial assault and denying the PLA a lodgment on its main island. Meanwhile, the United States and other allies would engage China's surface combatants, submarines, and airpower operating around Taiwan, including by undermining their critical supporting systems. There are an infinite number of variations on how such a war might play out. The surest way to persuade Xi Jinping that the costs and risks of provoking such a war would exceed any possible benefit is to show him that China's air-naval power within the First Island Chain (FIC) would likely be destroyed during an all-out conflict.

Even though Taiwan must do more to strengthen its own defenses and resilience, the United States must also organize and equip itself to

defeat the PLA directly. Demonstrating this capability will have a number of strategic benefits. It will give Taiwan's vulnerable democracy the confidence to resist China's gray zone tactics and give the Philippines the confidence to stand up to Beijing's maritime aggression in the South China Sea. Moreover, a credible conventional deterrent would complement existing extended nuclear deterrence arrangements and reduce pressure on regional allies such as South Korea and Japan to develop independent nuclear capabilities. If for whatever reason Taiwan falls under PRC control in the future, it will be all the more important for the United States and its allies to have a dominant conventional force that can deter further PRC aggression.

It is important not to focus too narrowly on capabilities—the systems, technologies, and operational techniques for achieving US objectives in specific scenarios. Mindful of the increasingly dangerous global context, the United States must also ensure that it has sufficient *capacity*—the scale and endurance to sustain large-scale operations over time, deploy sufficient forces across multiple theaters, and maintain readiness for multiple simultaneous conflicts.[13]

To achieve these objectives, Washington needs to break from the status quo. Over the past two decades, China has conducted the largest military buildup since World War II. It is systematically developing a force capable of disrupting US operations in the region, backed by a vast DIB.[14] Although the US Department of Defense (DOD) has made progress in responding, it is moving too slowly. Over the next decade, the DOD will need more resources, better coordination with industry in the United States and allied countries, and pressure from Congress to use its resources wisely and enact necessary reforms. Preserving deterrence will require more money, but it is not just a question of money. It is, more fundamentally, a matter of political will. The world's major democracies must work more closely together to deter a great-power war, and this collaboration will require American leadership. It will not happen organically.

In short, what is needed is a clear mandate from the president and Congress for a crash effort to preserve deterrence. Establishing this

political mandate requires building consensus on why the issue matters and how to address it and engaging the public in an honest conversation about the trade-offs involved. As Franklin Roosevelt told the public in his famous "Arsenal of Democracy" fireside chat on December 29, 1940: "Our national policy is not directed toward war. Its sole purpose is to keep war away from our country and away from our people." To that end, "We must have more ships, more guns, more planes—more of everything. And this can be accomplished only if we discard the notion of 'business as usual.'"[15]

As bipartisan consensus forms in principle on the importance of maintaining deterrence, it is time for the next, more challenging step: defining the specific decisions needed to secure our strategic objectives.

What This Book Is, and Who It Is For

Nearly all the rigorous scholarly and policy literature on defense issues in the United States is written by experts, for experts. A vast quantity of thoughtful work already exists in the public domain. Unfortunately, much of it focuses on relatively narrow questions, uses many acronyms and too much jargon, and assumes substantial foundational knowledge about how militaries are organized and how military operations work. There is also a great deal of writing about emerging defense technologies. However, much of this literature is similarly technical, focusing more on the tech itself than how it is productized, integrated into existing forces and operating concepts, and used in combat. By contrast, most nonspecialist audiences learn about defense issues from journalists who are not given the word count to explain foundational concepts in depth. Journalists also face pressure from editors to use sensational language when writing about emerging technology. Because the knowledge gap between specialist and nonspecialist audiences is so great, it can be challenging for the latter group to follow debates about US defense policy and procurement, let

alone participate constructively in them. This has become an impediment to an inclusive national conversation about what must be done to preserve deterrence.

This book is an attempt to bridge the gap. We came to write the book because one of us (Freymann) was a scholar of China who wanted a more comprehensive understanding of the US-China military balance. Looking for reading recommendations, he approached Halem, a military analyst. What followed was a multiyear collaboration as two historians with very different backgrounds tried to synthesize a wide-ranging body of literature, in conversation with technologists, senior retired military officers, and other historians. At the end of this process, we decided to write the accessible foundational book that Freymann was originally looking for but that did not yet exist.

People who want to set out on a similar intellectual journey are the primary audience of this book. We have therefore written the book to be widely accessible: to members of Congress and their staffs, technologists, investors, policy analysts, and interested generalists. As geopolitical tensions rise and the line between civilian and defense technology continues to blur, we also aim to reach business leaders and entrepreneurs who may not have previously seen themselves as stakeholders in national security. As supply chain vulnerabilities, emerging technologies, and industrial capacity become central to military effectiveness, the private sector is becoming increasingly integral to US defense capabilities. Graduate students and advanced undergraduates interested in US national security policy may also find the book helpful. The typical reader will already be generally familiar with the broader state of US-China relations but will have gaps in their knowledge about defense issues.

Each chapter aims to provide a high-level overview, starting with a historically rooted conceptual framework of one aspect of air-naval warfare and then applying it to the current situation in the Indo-Pacific. We have a point of view, and each chapter includes some policy recommendations. However, we do not take positions on every issue: our purpose in writing the book is to frame a conversation, not

to conclude one. Readers need not read directly from front to back, and we encourage using the endnotes as a guide to further reading. Experts may find discussions in their area of specialty to be somewhat basic, but we hope they will find them measured and balanced. Specialists may benefit from seeing how their areas of expertise fit into the broader deterrence picture.

In particular, we wrote this book for skeptics. The DOD's fiscal year 2024 budget was $842 billion—more than all federal nondefense discretionary spending combined.[16] Reasonable people will want a good explanation for why the DOD needs even more resources. National security experts must take this skepticism seriously, acknowledging that spending more resources on national defense inevitably involves trade-offs with other priorities that directly affect Americans' daily lives. It is ultimately up to the American people, via their elected representatives, to decide what price is worth paying to preserve deterrence. We hope this book can help to orient elected officials and their staff who want to engage more in the details of these budget conversations and explain the trade-offs to their constituents. Deterrence is not created or preserved by discrete programs. The US military is a complex system engaged in an ongoing technological competition with sophisticated adversaries. To understand which programs are essential and which can be scaled back, it is essential to have a framework for understanding what each program contributes to the system as a whole.

A word on what this book does not cover. The book addresses Russia, North Korea, and Iran only in passing. The best way to deter them in the Indo-Pacific is to deter China. Russia maintains a nuclear submarine bastion in the Sea of Okhotsk, but it is not a major conventional military power in the region. North Korea has a growing arsenal of nuclear warheads and ballistic missiles, but it is focused mainly on menacing its democratic neighbors and deterring Washington and Seoul from seeking regime change, not executing precision strikes against South Korea, Japan, or US bases. South Korean and US forces could defeat a conventional North Korean invasion, despite

the significant damage it would cause. Furthermore, Pyongyang understands that if it uses weapons of mass destruction against a US ally, it should expect devastating retaliation. We also devote relatively little space in the text to discussion of allied militaries. This omission does not imply that they are unimportant. Several US allies, particularly Japan, would be crucial partners in a US-China war. All regional allies would be profoundly affected. US allies must carry their weight by spending an appropriate amount on their own defense. As we will see, allies also have a vital role to play in creating a common DIB. However, since the United States will remain by far the dominant allied military in the region for the next decade, allies and partners will for better or worse have to follow Washington's lead in designing their forces and DIBs. More discussion of allies and partners can be found in the notes.

Method

This book's methodological approach diverges from much of the existing literature on military innovation. Most existing work falls into three main categories: rich and narrowly focused case studies based on archival research, international relations theory, and policy analyses emphasizing specific contemporary capabilities or threats.[17] By contrast, we employ an "applied history" approach that draws on multiple historical cases to reveal patterns relevant to today's strategic and technological challenges, rather than deriving overarching theories of military change. This methodology is informed by Williamson Murray and Allan Millett's pioneering work at the end of the Cold War, which emphasizes the value of historical insights in addressing contemporary military problems.[18]

Our approach examines adaptation patterns across multiple domains—air, naval, space, and nuclear—rather than focusing on innovation within a single domain.[19] We focus on three central questions. First, what would a war with China look like, strategically and

operationally? Second, what weapons, ships, aircraft, and support systems can the United States and its allies produce, and what do they struggle to produce? Third, how do we get from the force we have to the force we think we will need by adapting current capabilities and integrating multiple technologies, some of which are fully mature, some of which are scaling, and some of which are still emerging? The final question is the hardest. Transformational technologies always begin at the edge of our capabilities. If appropriate, they grow in presence and influence and over time come to dominate the force. Each chapter in this book explores all three themes together.

From this, it should also be clear that our approach differs from other contemporary analyses of the US-China military balance. Other works typically emphasize detailed capability assessments, the most prominent being the DOD's annual *China Military Power Report*.[20] Still other books focus on the strategic implications of the military balance.[21] We draw on these works for primary data and analytical insight, but our main interest is in identifying historical patterns about how militaries adapt and integrate emerging technologies. Based on this foundational understanding, we offer a framework for understanding the challenges facing the force today and anticipating potential evolution pathways. Our approach draws on Dmitry (Dima) Adamsky's work on innovation cultures and Michael Horowitz's insights on military diffusion, but it applies their perspectives to the specific challenge of sustaining deterrence.[22] The downside of our applied historical approach is that it prioritizes practical insights over theoretical parsimony. The potential benefit is that it can provide policymakers with a historically grounded way to think very practically about how to preserve combat effectiveness amid technological transition.

Historical sensibility is useful for stress-testing institutional memory in a military that hasn't fought a major air-naval war since 1945. It can provide a framework for thinking about aspects of the current situation that did not apply eighty years ago—like space power and drones—as well as features of air-naval warfare that remain constant even as technology evolves. History can serve as a benchmark for

evaluating how particular emerging technologies might affect the future battlefield and how long it will probably take to adopt them. Finally, history is useful for evaluating how the services' operational concepts fit together and align with the DOD's procurement plans.[23] Military officers know the value of history. They study history as part of their formal training and are encouraged to draw on it in devising plans. As former Secretary of Defense James Mattis noted in 2017: "If you read enough biography and history, you learn how people have dealt successfully or unsuccessfully with similar situations or patterns in the past. It doesn't give you a template of answers, but it does help you refine the questions you have to ask yourself."[24] Readers with military experience will likely be familiar with many of the case studies discussed in this book. To many civilians, however, aspects of this history will likely be surprising.

Of course, no single historical analogy or case study is a perfect match for the current situation. Indeed, focusing excessively on a single case risks overdetermined and misleading conclusions.[25] In this book, we highlight *geography* and the *changing character of warfare*, rather than specific scenarios. We focus on *functions* and the *character of technological change* rather than specific products. We discuss *analogies* and *long-term trends* that shed light on the current situation, while acknowledging aspects of the current situation that are effectively unprecedented. Such insights do not provide definitive guidance on specific programs or procurement decisions, but they provide a sensibility that is nonetheless useful for surfacing risks and possibilities that may not otherwise be obvious.

Much has been written about what the United States can and must do to preserve deterrence in the short term and why these steps must be taken urgently.[26] The key action items involve strategies and assets that would make any attempted invasion of Taiwan costly and likely to fail. There is also much that Taiwan must do.[27] Urgent investments in mobile, survivable, and scalable defensive capabilities, combined with an infrastructure resilient to siege tactics, would help Taiwan present itself as a "porcupine" that China cannot subdue quickly or

without incurring significant losses. Air defenses, including mobile missile systems and short-range defense, are necessary to deny China air superiority, while mines and anti-ship missiles can defend Taiwan's coastline and disrupt an amphibious assault. Coastal artillery and loitering munitions would allow Taiwan to establish kill zones on its shores, further complicating any invasion attempt. In addition, robust information and electronic warfare capabilities are needed to deceive and disrupt PLA targeting, while resilient infrastructure and expanded fuel and food stockpiles would enable Taiwan to withstand a potential blockade.[28]

Still, steps that are necessary to preserve deterrence over the next five years, using existing capabilities, may not be sufficient to preserve deterrence against an emboldened PRC in the longer term. Over a five- to fifteen-year horizon, the key question is how the US and allied militaries and their DIBs can adapt to the effects of emerging technologies more effectively than the PLA and the authoritarian states' DIBs.[29]

This book focuses on that longer horizon. It is interested in steps that, if taken over the next five years, could significantly bolster deterrence during the 2030s. It focuses on the interplay among budgets, bureaucracies, operational concepts, technologies, and industrial processes. Issues not relating to procurement and strategy—such as doctrine, training and readiness, and cyber and economic warfare—are discussed only in passing.

Assumptions

The policy recommendations in this book are rooted in a set of base-case assumptions. Our first and most important assumption is that *China is currently deterred* from attempting to revise the status quo by force and that the fear of losing a conventional war against US forces is a key reason. Based on our reading of the open-source evidence, we assess that Washington and Beijing currently share this assessment—but

that China is rapidly narrowing the gap and that, as the gap narrows, the risk that China may miscalculate will grow. Left unchecked, China may seize the relative advantage in the military balance within the next five years. At that point, it might promptly launch a direct military attack on US interests in the region. Alternatively, it could display its superiority and threaten war to coerce the United States or its allies, while pressing to increase its margin of advantage. As US Indo-Pacific Command Commander Admiral Samuel Paparo put it in February 2025: "We operate on increasingly thin margins for error."[30]

We also make several important assumptions about the future. We assume the pace of innovation in relevant technologies will continue to follow recent trends. (This is notably hard to judge in the case of AI, where many analysts believe that leading AI models are improving exponentially. We do not assume that artificial general intelligence or superintelligence will fundamentally transform the strategic balance in unpredictable ways in the 2030s—though we acknowledge this as a risk.[31]) We also assume that China's military spending will continue to grow faster than that of the United States, even as China's overall economic growth continues to slow, and that the US DIB will by comparison remain far less efficient than its PRC counterpart. Following the Congressional Budget Office, we expect the US baseline defense budget to grow by around 2 percent per year in real terms through 2040—assuming the United States is not pulled into a great-power war before then (see fig. 0.1).[32] We expect these incremental funding increases to go largely toward personnel salaries and maintenance costs and to be insufficient to support many major new capital expenditures. We therefore assume that Congress and the DOD face hard choices ahead and that some existing programs may have to be downsized or eliminated to free up funds for more urgent priorities.[33] We assume that higher spending will have a nonlinear impact on readiness, but with a lag of several years and only if the money is allocated to high-impact programs.[34] Substantial special appropriations to enhance deterrence are likely, potentially totaling hundreds of billions

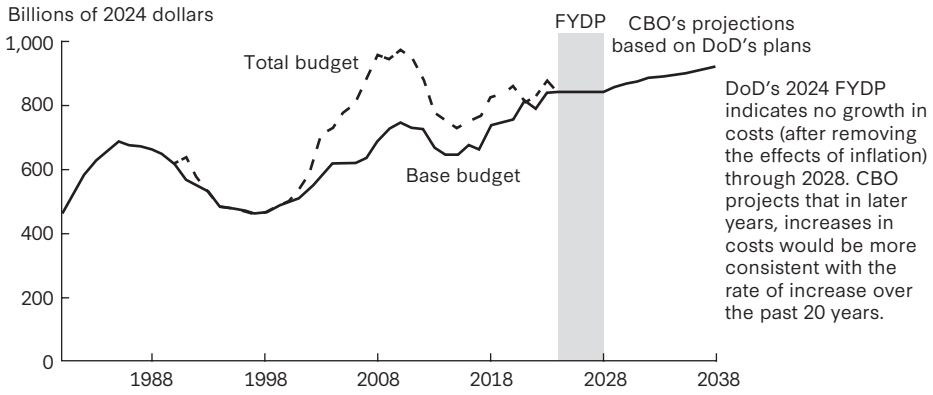

Figure 0.1 DOD budget, historical and projected through 2038. The base budget does not include special appropriations, which is how Congress often chooses to fund ongoing US military operations in specific countries.

Data source: Congressional Budget Office, *Long-Term Implications of the 2024 Future Years Defense Program*, October 2023

of dollars over the next decade—but the precise timing, size, and content of these packages will likely be hard to predict in advance, which will make it harder for the DOD and key contractors to plan effectively. Some of our assessments and policy recommendations are sensitive to these assumptions.

Politically and strategically, we hope for an abrupt break from business-as-usual, but we do not assume this as our base-case. Instead, we assume that as US adversaries deepen their cooperation, a bipartisan sense of urgency will gradually continue to develop in Washington about the risk of outright conflict with China. In this context, on the issue of procurement reform and reallocation of resources within the existing defense budget, we call for major changes while recognizing that incremental reform is the most likely outcome. Our focus is on identifying key gaps in the current force structure that can be addressed at relatively low cost through incremental, bipartisan reforms.

Chapter Summaries

The book begins by characterizing the evolving deterrence challenge in the Indo-Pacific and explaining why the DOD has been too slow to adapt to it. The following nine chapters then dive deeply into various aspects of the deterrence challenge: surveillance and reconnaissance, long-range strike, logistics, the surface fleet, the defense industrial base, unmanned aerial systems (UAS), undersea warfare, space, and the nuclear enterprise. The conclusion takes a step back and argues that the book's recommendations are politically feasible—but only if Congress and the president are prepared to explain to the American people that these steps are necessary to deter a catastrophic war with China.

Chapter 1 frames the deterrence challenge at a high level. Geography dictates that a Sino-American war would be an air-naval conflict quite unlike the land wars that the United States has prepared for and fought during the last eight decades. Air-naval warfare has certain fundamental characteristics that remain constant even as technology evolves. However, the Joint Force faces a major institutional challenge in adapting to emerging technologies such as long-range precision strike, unmanned systems, and electronic warfare in the Indo-Pacific, alongside understanding the role of mature space power in an air-naval conflict. The so-called Revolution in Military Affairs that began in the 1970s offers both inspiration and cautionary lessons for this institutional adaptation. Although each US military service is adopting a new operational concept to address these emerging challenges, the US national security community has yet to reach consensus on how to align these concepts with emerging technology, industrial capacity, procurement strategy, and allied coordination. The following chapters will aim to frame a conversation that works toward such a consensus.

Chapter 2 argues that air-naval combat hinges above all on surveillance and reconnaissance, termed "scouting" in naval parlance. In most general war scenarios, US and PLA air-naval forces would need

to hunt each other down over an enormous combat space. Whichever side can more effectively identify enemy assets and transmit that information rapidly to shooters—whether long-range missiles, strike aircraft, submarines, or warships—will hold a decisive advantage. Maintaining a coherent and resilient reconnaissance–strike complex is hard in the Indo-Pacific, particularly for the United States. The distances are vast, and in a conflict both sides would probably disrupt each other's systems through electronic, cyber, and antisatellite attacks. Improving the resilience of US command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems must therefore be a top priority, since a more robust system can better absorb enemy punishment. Counter-UAS technologies will also be both strategically and tactically important.

Chapter 3 explains how long-range precision weaponry is changing the character of air-naval warfare. Long-range strike capabilities can break apart enemy C4ISR and strike architecture, hitting targets from more than a thousand kilometers away with a reliable degree of accuracy. Although most of China's long-range munitions are designed to strike fixed targets such as air bases and critical infrastructure, China's more modern missiles are designed specifically to be effective against US surface warships and airfields. The US Navy and Air Force therefore urgently need adequate supplies of munitions that they can deploy from "stand-off" range. Keeping up with China in long-range strike capacity is more an industrial challenge than a technological one. Historically, when great powers fight major wars, they run down munitions stockpiles much faster than expected. The most capable missiles in the US arsenal are in particularly short supply. Expanding magazines on existing ships and aircraft will help buy time, but in the medium term there is no alternative to expanding industrial capacity to produce long-range munitions in the United States and allied countries. Allied forces will need vast quantities of munitions to show they can deny an invasion of Taiwan and break a potential blockade.

Chapter 4 discusses the role of logistics in US deterrence. It reveals both the preeminent role that logistics plays in major naval wars and

the risk that US logistics shortfalls could undermine the credibility of US deterrent threats. Indeed, in our estimation, the US military's logistics system is the single weakest link in US deterrence. The US maritime logistics system is in dire condition in its number of ships, its number of personnel, and its surge capacity. Different funding solutions could improve US Indo-Pacific Command's ability to take ownership for logistical expansion and hardening, but the Pentagon bureaucracy stands in the way. Congress must reform and recapitalize the enterprise. Not doing so eliminates the benefits of almost all other investments and turns reasonable operational concepts, particularly for the Navy, into strategic liabilities that undermine deterrence.

Chapter 5 considers how US naval planners should think about the design of the surface fleet in an era when long-range precision strike technology is rapidly advancing. The chapter does not take a position on either the optimal long-term size of the surface fleet or whether it should be primarily carrier based or surface-combatant based. Instead, it examines several indirect historical parallels to the contemporary situation, in which emerging naval and air–space scouting and strike mechanisms create uncertainty about future fleet design. It argues that the Navy must focus on maintaining capacity to adapt the fleet as relevant technologies mature, focusing in the meantime on platforms that can host new munitions and sensors, rather than immediately transforming the fleet at high cost. It is premature to declare the death of the aircraft carrier, but it is also essential to start building a potential alternative force structure in which smaller unmanned surface vessels (USVs) might play a dominant role. Even if traditional warships maintain their role in a future force, these new technologies will amplify their combat potential.

Chapter 6 explores why the existing DIB and its attendant procurement system is unprepared for a long-term, dynamic struggle with China—let alone a war. There are no quick fixes available because of the system's complexity and decades of underinvestment, which has sapped both industrial and workforce capacity. The current system has also diminished expertise within the Pentagon to think clearly about

procurement and DIB questions or to interface effectively with the private sector. The president and Congress cannot effectively compel the DIB to expand without fixing the broken incentive structures that have made the system slow to adapt to the changing strategic environment. Nor can or should the DOD completely eliminate its current procurement process, which is necessary for supervising complex ongoing programs and ensuring technological integration across the Joint Force. Instead, a combination of targeted reforms could accelerate the integration of new technologies into the existing force and align incentives for private contractors and subcontractors. With support from Congress, the DOD could move to multiyear contracting and reform the International Traffic in Arms Regulations (ITAR) to enable partnerships with foreign suppliers. A department-wide transformation to a "venture capital" model for defense procurement is both unlikely and potentially unwise. However, Congress should give the DOD more flexibility to invest in and procure from defense start-ups, incentivizing private capital and talented engineers and founders to keep moving into the space. Congress can also recapitalize production facilities for key systems, like submarines, and allocate funds to tackle the DIB's severe workforce and human capital issues. The DOD and Congress should jointly consider the merits of devolving some major procurement items back to the services, carefully assessing the risks of decentralization against the benefits of clear accountability that the current model wholly lacks.

Chapter 7 discusses the growing importance of UAS on the modern battlefield, ranging from small, attritable systems to high-cost, sophisticated jets. The war in Ukraine has demonstrated the value of small and large UAS for reconnaissance and strike missions. It has also indicated how commercially developed technology, both hardware and software, can be applied rapidly to modern combat problems. Without the ability to produce capable UAS in vast quantities and field effective counter-UAS (CUAS) capabilities, any military on a future battlefield will be at an acute disadvantage. US technological advantages in UAS have been eroded because the exquisite systems

built for the past thirty years of low-intensity Middle Eastern conflict are largely unsuited for a future great-power war in the Indo-Pacific: they are procured in too small numbers to remain relevant in a high-intensity conflict, and China's dual-use UAS producers enjoy economies of scale. To regain their competitive edge, the United States and its allies must cooperate much more closely on UAS and counter-UAS technology and supply chains, starting by banning imports of made-in-China UAS and adopting multiyear procurement to incentivize producers to invest in production capacity. The United States and its Indo-Pacific partners must work to adopt best practices for CUAS from the war in Ukraine, especially adversarial AI and electronic warfare (EW). As long as these CUAS technologies keep improving, swarms and "loyal wingman" aircraft will likely struggle in combat.

Chapter 8 discusses the undersea domain. Today, the US Navy's greatest strength—its high-quality submarine fleet—is set against the People's Liberation Army Navy's greatest weakness—its antisubmarine warfare capabilities. However, the readiness crisis in the US submarine fleet represents a profound challenge for sustaining deterrence into the 2030s.[35] Only around 60 percent of US submarines are ready for combat at any given time. Moreover, the US's submarine industrial base is the most overstressed part of a brittle DIB, fraught with maintenance, overhaul, and construction delays. The submarine industrial base's issues stem overwhelmingly from capacity constraints that could not be fixed quickly if war broke out. The chapter recommends an urgent capital investment on the order of tens of billions of dollars over several years to prevent a rapid downturn in US submarine production and sustainment. Modernizing allied yards to support US submarines is also essential. In the longer term, smarter and longer-range undersea drones, mines, and quantum-enabled sensors may begin to hold US submarines at risk, just as satellite reconnaissance and long-range strike are holding US surface assets at risk. This revolution is probably a story for the late 2030s and 2040s, so in the short-term, Washington has no alternative but to expand the existing

submarine fleet. Still, with one eye on these emerging technologies, the United States should build its new submarines to be adaptable.

Chapter 9 discusses space, which will be a critical domain in any US-China conflict. The United States, China, and other major militaries depend heavily on space-based systems for a range of operational needs. Space is now a mature domain integrated into operational planning, procurement, and strategy. In response to efforts by China, Russia, and North Korea to place US space assets at risk, Washington must accelerate efforts to make its space systems more robust and resilient. It needs adequate indications and warning, the ability to relocate satellites quickly, and a responsive launch capability. The American private sector is pioneering an important technology that can support this effort: constellations of attritable satellites in low-earth orbit (LEO). To maintain US advantages in launch, propulsion, satellite manufacturing, maintenance and repair, and emerging technologies such as quantum, Congress can cut red tape to support private industry and partner with allies to build a dual-use space industrial base and technology ecosystem. ITAR reform and tweaks to immigration rules for highly skilled scientists and engineers would be highly advantageous. More robust counterintelligence efforts will be essential to protect sensitive technology.

Chapter 10 discusses how nuclear weapons might affect deterrence in peacetime and conflict escalation during a conventional war. Any conflict between the United States and China would play out on a battlefield shaped by implicit and/or explicit nuclear threats. This is why China is modernizing and expanding its nuclear arsenal and working to secure a survivable second-strike capacity.[36] Fortunately, the United States retains advantages in its established secure second-strike capacity and its durable, if aging, nuclear arsenal. The United States should recapitalize its existing nuclear establishment, continue to modernize its arsenal, and consider deploying nonstrategic nuclear assets and more intermediate-range nuclear-capable delivery systems in the region. While remaining strongly opposed to nuclear proliferation, it may also consider offering NATO-style

"nuclear sharing" to South Korea and Japan. Ballistic missile defenses are helpful, but under the current technological regime, offensive investments are a more cost-effective way to enhance nuclear deterrence.

Finally, the conclusion steps back and surveys the emerging landscape of a potential Indo-Pacific conflict. It is not too late for the United States to retake its historic position as the arsenal of democracy and modernize its force to deter a great-power war. However, history suggests that unless Congress can find the political will, hard choices will not be made, and deterrence may continue to weaken until it is too late. Political leaders have a responsibility to explain to the American people that the current geopolitical moment presents dangers unseen since the early 1960s and, in some ways, the period immediately preceding World War II.[37] US deterrence failed in 1941. We cannot afford to let it fail again today.