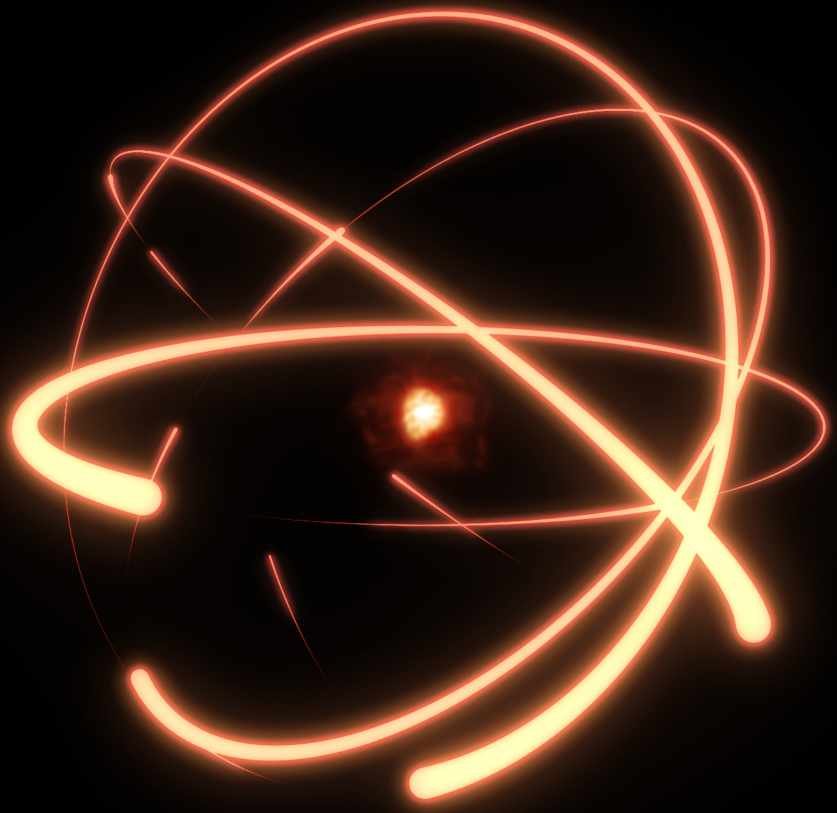
SEPTEMBER 2023

Project Atom 2023

A Competitive Strategies Approach for U.S. Nuclear Posture through 2035



AUTHORS
Heather Williams
Kelsey Hartigan
Lachlan MacKenzie
Rob Soofer
Tom Karako
Oriana Skylar Mastro
Franklin C. Miller
Leonor Tomero
Jon Wolfsthal

A Report of the CSIS Project on Nuclear Issues

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

SEPTEMBER 2023

Project Atom 2023

A Competitive Strategies Approach for U.S. Nuclear Posture through 2035

AUTHORS

Heather Williams
Kelsey Hartigan
Lachlan MacKenzie
Rob Soofer
Tom Karako
Oriana Skylar Mastro
Franklin C. Miller
Leonor Tomero
Jon Wolfsthal

A Report of the CSIS Project on Nuclear Issues

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

About CSIS

The Center for Strategic and International Studies (CSIS) is a bipartisan, nonprofit policy research organization dedicated to advancing practical ideas to address the world's greatest challenges.

Thomas J. Pritzker was named chairman of the CSIS Board of Trustees in 2015, succeeding former U.S. senator Sam Nunn (D-GA). Founded in 1962, CSIS is led by John J. Hamre, who has served as president and chief executive officer since 2000.

CSIS's purpose is to define the future of national security. We are guided by a distinct set of values—nonpartisanship, independent thought, innovative thinking, cross-disciplinary scholarship, integrity and professionalism, and talent development. CSIS's values work in concert toward the goal of making real-world impact.

CSIS scholars bring their policy expertise, judgment, and robust networks to their research, analysis, and recommendations. We organize conferences, publish, lecture, and make media appearances that aim to increase the knowledge, awareness, and salience of policy issues with relevant stakeholders and the interested public.

CSIS has impact when our research helps to inform the decisionmaking of key policymakers and the thinking of key influencers. We work toward a vision of a safer and more prosperous world.

CSIS does not take specific policy positions; accordingly, all views expressed herein should be understood to be solely those of the author(s).

© 2023 by the Center for Strategic and International Studies. All rights reserved.

Center for Strategic & International Studies
1616 Rhode Island Avenue, NW
Washington, DC 20036
202-887-0200 | www.csis.org

Acknowledgments

PONI owes many thanks to the authors of this compendium for their commitment to the project and the effort that they dedicated to their papers. The team is grateful to Elaine Bunn, Francesca Giovannini, Kathleen McInnis, Ankit Panda, Lynn Rusten, and Greg Weaver for their work as reviewers. Their feedback greatly strengthened this report. Suzanne Claeys played a key role in organizing and facilitating this project and contributed greatly to the project's ultimate success.

PONI would also like to thank the CSIS publications team, including Jeeah Lee, Katherine Stark, Rayna Salam, and Phillip Meylan for their help in the editing and publication of the report.

Lastly, PONI would like to express gratitude to our partners for their continued support. Among many partners, this report was made possible with support by the Defense Threat Reduction Agency.

This report was prepared as an account of work sponsored by an agency of U.S. government. Neither the U.S. government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the U.S. government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the U.S. government or any agency thereof.

Contents

China's Nuclear Enterprise

Trends, Developments, and Implications for the United States and Its Allies

By Oriana Skylar Mastro[23]

The focus of this volume is how the United States should respond to deterring two peer competitors: Russia and China. This paper's main contention is that the nature of U.S.-China military competition from 2035 to 2050 will exhibit some unique characteristics compared to the U.S.-Russian nuclear relationship that require new thinking on these topics. As such, this paper differs from others in this volume by focusing on what changes in Chinese military posture, doctrine, and modernization mean for U.S. nuclear deterrence strategy, modernization, reassurance of allies, and arms control efforts. The reason for focusing on China is to challenge the premise that the United States should treat Russia and China as similar peers, and because assumptions among nuclear experts about what modernization efforts in China mean for Chinese nuclear policy are limiting thinking on ideal policy responses. The details of force modernization are consistent with the idea that China is maintaining the same nuclear policy it has had since 1964. This is advantageous for the United States, and thus most of this paper's recommendations revolve around discouraging deviations. Admittedly, this piece raises more questions than it answers, but understanding which components of U.S. thinking will also serve the United States well in the future, and which require additional consideration, is the first step to devising any useful responses. Each section lays out relevant Chinese approaches, U.S. assumptions, and key issues that color best responses. While this paper focuses on Chinese nuclear modernization, what it means for U.S. strategy, and how the United States should respond, it should not be interpreted as dismissing the challenges of responding to Russian nuclear aggression and expansion. Rather, it focuses on challenging the premise that the United States needs to make significant changes in posture or policy to deter China.

The advisable U.S. approaches to force modernization, deterrence, and arms control depend on understanding Chinese nuclear modernization. While there are recent indications from the U.S. Department

of Defense that China will increase its nuclear arsenal, these changes are insufficient to suggest that China has abandoned core aspects of its nuclear policy such as no-first-use, no tactical nuclear weapons, and not striving for parity with the United States in terms of the size of its arsenal.[24] China's modernization efforts are compatible with maintaining its policy, but it is adjusting its posture given advancements in U.S. missile defense and increased tensions in U.S.-China relations. These points have important implications for ideal U.S. modernization plans, deterrence of China, reassurance of allies, and arms control. One of the most important takeaways is that the United States should avoid relying on nuclear weapons to deter China's conventional threats, as this might encourage China to threaten nuclear use in response to the United States' conventional activities.

This paper first outlines fundamental principles of China's nuclear policy, to include limited assured retaliation. It then explores the implications of China's nuclear policy for U.S. force posture, modernization, extended deterrence, and arms control.

China's Nuclear Policy

CHINA'S MINIMAL RETALIATION CAPABILITY AND NO-FIRST-USE PLEDGE

The expansion of and improvements in China's nuclear arsenal by 2050 do not necessarily mean that China is abandoning its limited assured retaliation strategy. The buildup in numbers is consistent with China's traditional nuclear policy of a minimal retaliation capability with a no-first-use pledge.

First, the Chinese strategy of assured retaliation requires that Beijing develop enough weapons to absorb a strike and still impose unacceptable damage from the adversary's perspective. In the strategic doctrine of the Second Artillery, the predecessor of the People's Liberation Army Rocket Force, China's strategic nuclear forces focus on "effective and limited nuclear counterattack" as the core of nuclear deterrence. As China makes a no-first-use promise regarding nuclear weapons and only has a limited number of nuclear weapons, this doctrine emphasizes the need for the preservation of nuclear forces as a prerequisite to carry out "focused strikes," as well as "scientific use of nuclear firepower, and carefully crafted strike plans" in order to "achieve the greatest political and military benefits at a relatively small cost."[25] Although China's nuclear weapons are limited, the nuclear forces that survive a surprise attack by a nuclear adversary are still sufficient to carry out a nuclear counterattack, and a few nuclear weapons attacking important targets in the adversary's territory could destroy its industry, society, and mentality and paralyze its state apparatus.[26] This posture leaves some flexibility in terms of specific numbers; Chinese strategists want sufficient forces but are careful not to fall into the track of building "excessive" ones.[27]

Second, the contours of Chinese nuclear modernization are consistent with the view that nuclear weapons are only useful for deterring nuclear use and do not have a warfighting component. Although the United States has assessed that China may be moving toward a launch-on-warning posture, which means they would launch a nuclear strike upon detecting an incoming attack, this policy is compatible with China's no-first-use policy.[28] Chinese leaders have also increasingly focused on growing regional nuclear options such as the DF-26 and DF-21A/C missiles, but these are attractive mainly because they are regional weapons lower on the escalation ladder and thus their use is more strategically feasible in the event of a conflict.[29]

Lastly, the "sudden" change in nuclear policy around 2018 and 2019 can be explained within the context of China's traditional nuclear policy. China's level of concern regarding U.S. nuclear capabilities "suddenly" surged around this time period, consequently accelerating its nuclear force development. Advancements in

missile defense which reduced the retaliatory capacity of a smaller arsenal further supported the need. The Pentagon notes in its 2022 report to Congress that China's "long-term concerns about United States missile defense capabilities" have likely spurred investments in hypersonic glide vehicles and fractional orbital bombardment systems (FOBS).[30]

Additionally, Chinese leaders likely aspired to strengthen their nuclear deterrent long before 2018 given U.S. dominance.[31] Chinese leaders have multi-stage plans in their military modernization; in the conventional domains of competition, the strategy was to modernize the force first (i.e., increase the proportion of modern equipment) and then to expand the numbers of certain platforms. Notably, Xi Jinping explicitly directed the military in 2012 to "accelerate the construction of advanced strategic deterrent"[32] capabilities; this has been the strongest and most unambiguous public statement on the matter. Coupled with recent investments in strategic nuclear submarines, China's emphasis on quality has expanded to include a growing willingness to invest in quantity long before 2018.[33]

CHINA IS NOT SEEKING PARITY

China is not striving for parity with the United States. Chinese leaders have long understood, since 1964, that they cannot compete with the United States in the quantity of nuclear weapons, and thus they have needed to embrace a different approach.[34] As Mao Zedong stated in December 1963, China needed to have the atomic bomb but could not afford to compete for parity in numbers.[35]

Recent reporting has caused heightened concern that China is building up its nuclear arsenal. In 2021, anxiety amassed over China's nuclear modernization: satellite imagery showed that approximately 360 silos were under construction at facilities in Gansu, Inner Mongolia, and eastern Xinjiang.[36] In a worst-case scenario, with DF-41s carrying three warheads in each silo, Chinese intercontinental ballistic missiles (ICBMs) could "carry more than 875 warheads."[37] The Pentagon's annual report to Congress estimated that the the People's Liberation Army (PLA) now has over 400 nuclear warheads; if current production trends continue, China could have as many as 1,500 by 2035. The report also estimated that China currently has at least 300 ICBMs.[38]

But it would be a mistake to take these projections at face value or to conclude that such an uptick signifies that China is now striving for parity, as some experts have posited.[39]Admittedly, China's avoidance of direct competition in nuclear power was starker in the early 1990s, when the United States had 47 times more nuclear weapons than China.[40] But even the worst-case projections of 1,000 weapons puts the Chinese arsenal at less than a quarter of the current U.S. level of 5,244 nuclear weapons.[41] Additionally, the fact that China has more land-based launchers than the United States is more a testament to the differences in nuclear posture than heightened threat; about three-fourths of China's arsenal is land based, compared to one-fifth for the United States.[42]

One critique of these numerical comparisons is that the most strategically relevant metric is not total numbers; instead, strategists need to consider deployed nuclear weapons versus stockpiled weapons. The United States has 1,770 deployed in accordance with the New START (technically 1,550 are allowed, but bombers count as "one" even though they can carry multiple nuclear weapons). In other words, when comparing arsenals, some might use the 1,770 deployed number instead of the 5,244 that quantifies the United States' total inventory.[43]

But even here, the evidence for a China striving for parity is weak. Under the New START conception of "deployable" nuclear weapons—carried by ICBMs on alert, submarines out on patrols, and bombers—China's nuclear weapons are not deployable; they are in fixed locations and cannot be deployed to the Western Pacific or the South China Sea.[44] But there is evidence that China might want some "deployable" nuclear weapons

in the future; solid-fueled missiles such as the DF-41 and DF-31AG have much faster fueling times and require fewer support vehicles, and China's Jin-class submarines have fueled the nuclear-armed JL-2 submarine-launched ballistic missile (SLBM) since 2015.[45] In total, China has six Jin-class ballistic missile submarines (SSBNs), and the Pentagon has confirmed that they are "conducting continuous at-sea deterrence patrols" as of February 2023.[46]

CHINA'S SECOND-STRIKE CAPABILITY

Chinese modernization is driven by concerns about maintaining a second-strike capability needed for deterrence.

From China's perspective, the strategic environment has changed in ways that call for a larger, more survivable arsenal even under its current nuclear policy. The United States has intensified the construction of a missile defense system in the East Asian region: the Aegis system. This is deployed on 17 U.S. Navy destroyers and cruisers in the region to detect, target, and engage ballistic missiles. These Aegis ballistic missile defense (BMD) ships have the capability to intercept short-, medium-, and intermediate-range ballistic missiles during their midcourse or terminal flight phases. They also play a role in defending the United States by detecting and tracking ICBMs and relaying this information to Ground-Based Interceptors in Alaska and California. As of December 2018, the system had a success rate of 40 out of 49 attempts in intercepting ballistic missile targets.[47] China believes this poses a serious threat to the reliability and effectiveness of China's nuclear counterattack capability.[48] Second, the nuclear arsenals of neighboring countries like India, Pakistan, and North Korea have increased in recent years.[49] Possibly as part of a move toward a launch-on-warning posture, China has been increasing its inventory of regional nuclear-capable systems, such as the DF-26 and DF-21A/C missiles. These are designed to target various assets, including naval vessels and land-based targets, enhancing China's strategic capabilities and potentially altering the regional balance of power.[50] Additionally, major countries are vigorously developing new types of conventional military capabilities that could be used against its nuclear capabilities.[51]

China has also built up and tested its own missile defense program in recent years. Specifically, China has focused on developing a ground-based mid-course missile defense systems capable of intercepting short- and medium-range ICBMs, including the HQ9 and HQ19 missile defense systems.[52] Despite increased ground-based interception capabilities, it is unlikely that China would deploy this technology at scale. Rather, these missile defense systems would be deployed at fixed sites including command and control (C2) facilities and missile silos. In April 2023, China's defense ministry announced that it successfully conducted a ground-based mid-course missile interception test. Details of the target of the test and the number of interceptors launched were not provided by state officials.[53] Despite progress in interception capabilities for short- and medium-range missiles, China has not announced the development of a long-range system as of 2022.[54]

Thus, the likely explanation is that China is developing capabilities to ensure that it has a second-strike capability. In the 1980s, China began making significant advances in ICBM development and deployment, and from the mid-1990s onwards, China's rocket force has moved from fixed silos to mobile launchers, shifted from liquid to solid fuel, and modestly expanded the number of warheads and ICBMs that include multiple independent reentry vehicles (MIRVs).[55] Now with an arsenal of at least 60 DF-5s, 78 DF-31s, and 54 DF-41s coming online, China can deliver 90 missiles with 130 warheads to the continental United States.[56] The number of warheads on China's land-based ICBMs capable of threatening the United States is expected to grow to roughly 200 by 2025.[57] The United States does not consider ICBMs second-strike systems, but that is because the United States puts them on high-readiness, maintains a launch-on-warning posture, and relies much more on its sea and air legs of the triad than on its land-based systems (while about three-fourths of Chinese forces are land-based).

This could signal a shift to a launch-on-attack posture, but it is also consistent with the need to take measures such as deploying mobile defenses to key sites including fixed silos and C2 facilities to reduce the impact of a first strike in order to maintain a second strike. Moreover, China has been making significant advancements in its early warning radar and satellite capabilities. These developments aim to enhance its ability to detect and track incoming threats, such as ballistic missiles, and improve its overall situational awareness. The deployment of advanced early warning radars, such as the JY-26 and JY-27A, demonstrates China's commitment to strengthening its air defense capabilities.[58] Additionally, China's growing network of reconnaissance and early warning satellites, including the Yaogan and Gaofen series, contribute to its ability to monitor regional and global activities more effectively.[59] These advancements in early warning systems not only bolster China's defense capabilities but also have a positive impact on stability, as they contribute to China's confidence in its second-strike capabilities.

China has also been developing hypersonic weapons, which pose particular challenges to missile defense systems because of features such as their long range, low altitude, high maneuverability, and adjustability.[60] The Chinese military has also increased the number of ballistic missile brigades by around a third in the past three years both to enhance its nuclear-strike capabilities amid escalating tensions with the United States and to prepare for a possible war against Taiwan (which includes the need to deter U.S. nuclear coercion).[61] One Beijing-based military source said that China has deployed its most advanced hypersonic missile, the DF-17, to the area.[62] In this way, it is possible that technological developments, in particular China's ability to defeat U.S. missile defense systems, will create more stability by convincing Beijing its arsenal is sufficient to deter nuclear use.

THE POSSIBILITY OF A CHINA-RUSSIA ALLIANCE

China has no interest in forming a traditional military alliance with Russia. The results of a long-term research project the author has been conducting on the China-Russia military relationship suggests that China and Russia are significantly aligned, but their alignment is limited to facilitating China's challenge to U.S. hegemony in Asia; it does not include helping Russia to take on the United States in Europe. Additionally, military support from Russia mainly comes in the form of assisting China in building up its own combat capabilities, though recent activities suggest movement toward supporting China, to a limited degree, in wartime as well. In other words, the two sides are not preparing to fight together in the traditional sense of allies. China also prefers that Russia not threaten the North Atlantic Treaty Organization (NATO) if it is fighting the United States because that increases the likelihood that U.S. allies will become deeply and directly involved, in which case the likelihood of victory plummets and the economic costs of war become too high. This means that Russia and China can be analytically treated as separate cases; hence, this essay is about what is needed to deter China. What is required to maintain nuclear deterrence and promote arms control with Russia is likely very different. Moreover, it is highly unlikely that China and Russia will actively collude in the context of a nuclear crisis or other major conventional war in Asia, but that does not negate the possibility of Russia taking advantage of a crisis in East Asia to advance its own objectives independently.

Implications for U.S. Policy

IMPLICATIONS FOR U.S. NUCLEAR MODERNIZATION

Assumptions about Chinese nuclear intentions lead to a popular recommendation in Washington: that the United States needs to build more nuclear weapons and delivery systems, or at the very least deploy more from its stockpiles. But it is far from clear that such a costly endeavor would have positive impacts on deterrence and stability in the region. Based on an assessment of Chinese thinking through readings and

interaction with Chinese counterparts, more U.S. nuclear weapons would have a negligible impact on China's calculus. The United States already has nuclear dominance, its elites are largely confident in its nuclear deterrent against China, and China's minimal deterrence posture has traditionally been based on the belief (correct, in the author's view) that the prospect of even one nuclear detonation on U.S. soil is enough to deter a U.S. nuclear attack.[63]

Moreover, more nuclear weapons will not solve other perennial issues, such as deterring a range of more limited Chinese military actions or non-military coercive activities, as their use in these scenarios is not credible. And given that collusion between Russia and China is unlikely in the nuclear realm (indeed, China is likely cautioning Russia to not use nuclear weapons in Ukraine), the United States need not match the combined arsenals of China and Russia for deterrence to hold. Moreover, even if China is increasing its arsenal to maintain a second-strike capability, and maintain a limited retaliatory capability, and even if it increases its arsenal to 1,000 weapons, this does not undermine U.S. deterrence.

While more work should be done to confirm these views, based on current trends and developments China will not necessarily change its nuclear strategy and posture away from the core components of treating nuclear weapons mainly as tools to deter nuclear use. Moreover, the existence of additional U.S. nuclear weapons does not fundamentally change China's thinking on its strategy, doctrine, and posture—at least not in ways that benefit the United States. It is possible that such moves could encourage changes in China's nuclear strategy that the United States should seek to avoid, such as China threatening nuclear use against any country that intervenes in its territorial disputes or against non-nuclear claimants to make gains. Indeed, dissuading China from moving away from the strategy that has served it well since 1964 should be the key objective of U.S. deterrence strategy and will be discussed more in the next section. What should the United States do, if not build up its own nuclear arsenal? It should use the Chinese buildup to make gains in other areas, such as conventional deterrence. This will be discussed more in the section on arms control.

IMPLICATIONS FOR NUCLEAR DETERRENCE

The most important role of nuclear weapons is to enhance deterrence. However, how nuclear weapons impact other countries' calculus on using force and what exactly states hope to deter can be debatable and evolve over time. This section focuses on the trade-offs between conventional and nuclear deterrence. This starts with the premise, developed in the previous section, that China's unique nuclear strategy to date ensures that the balance of nuclear warheads and delivery systems in the 2035 to 2050 period is as likely to deter Chinese nuclear use as any U.S. force posture could. This does not mean that there are not problematic deterrence and escalation dynamics; allies and partners might be reassured by a larger arsenal (even though logically they should not be). But the likelihood and nature of a war with China are unlikely to be significantly impacted by improvements in U.S. nuclear force posture.

This section addresses one of the primary topics in deterrence: the relationship between nuclear and conventional deterrence. During the Cold War, the United States adopted nuclear deterrence as an "asymmetrical response" against the Soviet Union.[64] The approach reinforced Washington's strength in nuclear weapons and, in turn, neutralized Moscow's advantage in conventional forces. The Eisenhower administration believed that nuclear weapons make deterrence more credible and decrease the risk of aggression at minimal cost. Conventional and mutual deterrence, however, were still valued among other administrations: Kennedy pursued a flexible response that would equip the United States with numerous feasible options against different types of aggressions as potential alternatives to resorting to nuclear weapons.[65] Nuclear deterrence is relatively stable between China and the United States, but because of China's unique approach, characterized

by no-first-use, minimal deterrence, and a lack of tactical warheads, the presence of nuclear weapons does not impose the level of caution on each side that deterrence theory might espouse.

The fact that both the United States and China possess nuclear weapons means that any war could escalate to the nuclear level, which should impose caution on both sides. There is reason to believe, however, that the power of nuclear weapons to deter conventional conflict is relatively weak in the U.S.-China case. This is because of China's view that nuclear weapons are only for deterring nuclear use and U.S. confidence in its escalation dominance in the nuclear realm. China firmly believes that nuclear war cannot be controlled once it begins; societal pressure on leaders not to back down, the circumstances of the country, and uncertainty about reactions from adversaries incentivize escalation. As such, China poses that strategic weapons are better than tactical weapons, and that they are only useful for signaling resolve, not waging war. Combined with practical concerns about having a weaker nuclear arsenal than the United States—where only half of its weapons can strike the continental United States—China is dedicated to maintaining a no-first-use policy.[66]

Moreover, the concept of mutually assured destruction was based on the U.S.-Soviet nuclear relationship, in which both countries had thousands of nuclear weapons and relative parity with one another. This is not the case for the United States and China, the latter of which has chosen to pursue an assured retaliation posture.[67] China also arguably did not have a second-strike capability until relatively recently. With only a few hundred warheads, and with the majority of its systems comprised of older missiles that were land-based, liquid-fueled, slow-launching, and stored in easily targeted silos, there was the possibility of a successful debilitating first strike. But China started to modernize its nuclear force in the 1990s, and now it has 50 to 75 ICBM launchers, of which 33 are the newer, road-mobile DF-31 and DF-31A. In 2017, China also showcased the DF-31AG, an improved version of the DF-31A missile, featuring an enhanced launcher, reduced support needs, and a wheeled transporter erector launcher capable of navigating off-road terrain.[68] As of 2015, China also has a sea-based nuclear deterrence in its four Jin-class nuclear submarines, each of which carries 48 nuclear-capable JL-2 SLBMs.[69] However, China's mobile missiles still have the highest survival rate.[70] This is because the Jin-class submarines are easily tracked.[71] Given advances in U.S. missile defense, it is possible that China could not deliver a sufficient retaliatory strike against the United States after absorbing an attack. Even if the United States needed 80 warheads to destroy one DF-31, given the challenges of detection, Washington could probably destroy enough that China could not reliably retaliate after absorbing an attack on its nuclear forces.[72]

The fact that the United States and China both possess nuclear weapons reduces the likelihood of conventional conflict, but it does not make it unthinkable, given the persistent asymmetry in vulnerability. Whether it should be the case or not, the reality is that Chinese military planners believe it is very possible to fight a conventional war with the United States without escalating to the nuclear level. This is in part because they believe that once nuclear weapons are used, escalation would be uncontrollable, and therefore neither side will strike first. Additionally, many Chinese experts believe that the United States would avoid intervening in a conflict between a U.S. ally and China if doing so would ultimately lead to a nuclear confrontation.[73] PLA strategists, not unlike some U.S. strategists, believe that advancements in intelligence, surveillance, and reconnaissance capabilities as well as C2 capabilities and precision weapons have further strengthened the ability to control war.[74] Indeed, most of U.S. war planning over Taiwan makes this assumption implicitly or explicitly. Whether or not a war escalates to the nuclear level depends on whether the two sides can negotiate a mutually acceptable settlement and can prevent accidents.[75]

In other words, the nuclear relationship between China and the United States has less of an impact on Chinese calculations about use of force than its perception of conventional balance of power. Unlike the Cold War, the United States cannot use nuclear threats to compensate for conventional issues given that China has no plans to attack and occupy other inhabited entities, with Taiwan being the exception—and this level of threat and cost makes U.S. willingness to fight nuclear wars relatively incredible. Indeed, in the case of U.S.-China tensions, the atrophy of U.S. conventional deterrence is the main driver for an increased likelihood of war, and thus the United States needs to prioritize re-establishing conventional deterrence. This means that in instances in which nuclear modernization may come at the expense of conventional force development, conventional force development should have priority. A good example of this was the United States pulling out of the Intermediate-Range Nuclear Forces (INF) Treaty in 2019 following "Russia's repeated violations of the treaty," which allows the United States to now develop a key class of new conventional weapons to deter China.[76]

There are two policy changes in particular that U.S. strategy should be designed to deter. First is a Sino-Russian alignment to the degree to which each provides some form of extended deterrence to the other. There is no consideration of this in China, so it does not present a real threat in the foreseeable future, but it is still worth mentioning.

Instead, the most important goal for U.S. deterrence policy should be to ensure it does not encourage a change in China's nuclear policy and in posture. To state this more clearly, if China starts to threaten nuclear use in response to U.S. conventional intervention in conflicts, this will severely impact U.S. war planning. China has never leveraged its nuclear arsenal to make up for conventional inferiorities, even in the 1990s when it was outclassed by far by the United States. But China might believe it could improve its ability to coerce U.S. partners and allies in Asia without risking confrontation with the United States. If the Chinese threat is credible, the United States will find itself with limited options to defend its allies in lower-level conflicts, in effect forcing the United States to concede the region to China. In other words, any movement in the United States to integrate conventional and nuclear operations, or to use nuclear weapons to make up for issues in U.S. regional conventional force posture, should be avoided, as they could encourage China to do the same.

In line with these concerns, the Biden administration's decision to cancel the nuclear-armed sea-launched cruise missile (SLCM-N) program in 2022 demonstrates a commitment to avoiding the co-mingling of conventional and nuclear systems on vessels that are not SSBNs.[77] This decision helps reduce the risk of platform ambiguity in the Indo-Pacific region, which could potentially escalate conflicts due to misinterpretation of intentions. By taking this step, the United States is actively working to prevent any changes in China's nuclear policy and posture that could result from the integration of conventional and nuclear operations, thus maintaining stability in the region and safeguarding the interests of its allies.

Given the limited nature of Chinese ambitions, the United States should also rethink the objectives of extended deterrence and how to best reassure allies and partners. First, given China's limited nuclear arsenal and policy of not using nuclear weapons against non-nuclear states, China's nuclear threat to U.S. allies in Asia is more limited than Russia's threat to NATO allies, especially during the Cold War. The big question concerns China's willingness to use nuclear weapons against U.S. assets in Asia, which might be on allied soil, as an intermediate rung on the escalation ladder to using them against the U.S. homeland. This is likely the motivation behind recent Chinese posture changes that show much greater interest in intermediate escalation options such as the DF-26, air-launched ballistic missiles (ALBMs), the DF-21, and the DF-17.

Notably, the DF-26 is often referred to as the "Guam Killer" due to its ability to target U.S. military installations on the island of Guam in the Western Pacific.[78] ALBMs can be launched from aircraft and offer the potential for

rapid response, mobility, and the ability to launch nuclear strikes outside of the coverage areas of traditional missile defense systems.[79] The DF-21 is commonly referred to as the "Carrier Killer" because of its intended capability to target aircraft carriers and other large warships.[80] The DF-17 is known for its maneuverability and ability to fly at extremely high speeds, making it more difficult for existing missile defense systems to intercept.[81] Additionally, as per the previous discussion, nuclear weapons do not deter admittedly problematic conventional activities. And the United States should avoid this pathway for the sake of assuring allies because it could encourage China to then threaten nuclear use in response to U.S. conventional activity, which would seriously complicate defense planning.

Implications for Extended Assurance and Deterrence

U.S. strategists should also revisit whether there are more costs than benefits associated with its allies in Asia possessing nuclear weapons, namely South Korea, Japan, and Australia. The downsides include that this could undermine the global nonproliferation regime and increase the likelihood of nuclear use due to an accident. Historical records show that the United States had many "close calls" where the "accidental or unauthorized detonation" of a nuclear weapon was a real possibility.[82] The upside is that Chinese conventional attack, and subsequent escalation to nuclear war, becomes less likely.

China's growing conventional and nuclear capabilities in the Indo-Pacific have driven many in allied countries to question their current approaches. Many in South Korea are worried by the possibility that U.S. extended deterrence could fail. In their eyes, North Korea's ability to hit any U.S. city could prevent U.S. assistance in the event of a restarted Korean war, making a South Korean nuclear deterrent the only guarantor of the country's safety—a logic that applies to China as well.[83] South Koreans are historically more open to the idea of developing a nuclear bomb than their Japanese counterparts, and in recent years that option has been discussed more frequently. In January 2023, President Yoon Suk Yeol commented that the nation may have to pursue nuclear weapons development or "demand redeployment of U.S. nuclear arms" to South Korea in response to the North Korean nuclear threat.[84] According to a 2022 poll, 71 percent of South Koreans were in support of the nation pursuing its own nuclear weapons.[85] The North Korean nuclear threat has also influenced thinking in this area. While no country has taken steps toward this option, what was once an unthinkable topic has now become more mainstream.

In Japan, the specter of a rising China and the Trump administration's unreliability undermined Tokyo's faith in extended deterrence. Russia's invasion of Ukraine has done even more to drive the debate underway in Japan. And whereas advocates of pursuing a nuclear weapon are traditionally found on the far right, this formerly taboo opinion is becoming more mainstream, with Prime Minister Abe Shinzo, shortly before his death, publicly raising the idea of housing U.S. nuclear weapons in Japan (i.e. through a nuclear-sharing arrangement).[86] While the current prime minister, Kishida Fumio, quickly rejected the suggestion, Kishida was also severely criticized for failing to "mention the [Treaty on the Prohibition of Nuclear Weapons] and for not clarifying Japan's future role in nuclear disarmament" in the 2022 NPT Review Conference.[87] It is important to note here that besides Russia's invasion, China's conventional buildup and increasingly aggressive foreign policy are likely driving most of Japanese anxiety. China's nuclear buildup is probably only a secondary driver. Japan's 2022 National Defense Strategy, for instance, discusses China's anti-access/area denial (A2/AD) network, aggressive activities around the Senkakus, and threat to Taiwan much more than its nuclear forces.[88]

While the Australian government maintains its firm stance on nuclear nonproliferation, the development of China's military capacity has posed increasing security risks to the nation and prompted discussion on

the strengthening of U.S. extended deterrence. Australian minister for defense Richard Marles expressed his concerns toward China's use of force in the South China Sea and called for increased U.S. military presence as part of Australia's new defense strategy.[89] Some defense analysts have questioned U.S. extended deterrence and suggested the possibility of acquiring nuclear weapons.[90] A 2022 poll revealed that 36 percent of Australians were in favor of obtaining nuclear weapons—more than double the amount in a 2010 poll conducted on a similar (though differently phrased) question.[91]

How can the United States deal with these growing concerns about U.S. extended deterrence? First, deployment of U.S. tactical nuclear weapons in Asia is not the answer. At best, this has little impact on Beijing's thinking, and at worst, it may enhance the legitimacy of China's attacks on U.S. regional bases and even on Taiwan if nuclear weapons were discussed as an option for cross-strait stability. That leaves the software options of greater consultations and joint defense planning, which might reassure allies and partners of U.S. intentions even as they have minimal impact on Chinese contingency planning.

Implications for Arms Control Approaches

Political scientist Joseph Nye defines arms control as efforts between nations to "limit the numbers, types, or disposition of weapons."[92] There are two key data points that drive the following recommendations on the potential of arms control agreements with China. First, China's participation in arms control regimes to date is largely driven by the belief that these arrangements give them a competitive edge. Granted, China's participation in arms regimes is widely touted as a success story.[93] In 1980, Beijing was essentially uninvolved in international arms control agreements, but by the late 1990s, its participation rate was on par with that of other major powers.[94] China joined the International Atomic Energy Agency in 1984, agreed to the Treaty on the Non-Proliferation of Nuclear Weapons in 1992, helped negotiate the Comprehensive Nuclear Test-Ban Treaty in 1996, and signed and ratified the 1993 Chemical Weapons Ban Treaty.[95]

But given China's different approach to nuclear weapons and conventional arms sales, China has sacrificed little in terms of potential power gains. It makes sense, therefore, for China to work to constrain the United States' ability to leverage its advantages in these areas. Indeed, Chinese experts such as Tang Yongsheng, professor at the PLA National Defence University, have been direct about the strategy, arguing that China should "use the UN arms control and disarmament institutions to restrain U.S. arms development and deescalate the U.S.-China arms race."[96] China has gone further than current regimes, advocating for a complete ban and destruction of nuclear weapons and advocating for a global no-first-use treaty for nuclear states.[97] Indeed, this self-serving approach to arms control best explains why China has more of a spotty record on export controls.

Second, taking into account the modernization discussion in the first section, which argues that China has yet to deviate from its minimal-deterrent nuclear strategy and posture, there is likely no possibility of China joining bilateral arms control arrangements between Russia and the United States that focus on restricting the quantity of its nuclear weapons or the effectiveness of its delivery systems until Russia and the United States reduce their arsenals to China's level. Fu Cong, the head of the arms control department of China's Ministry of Foreign Affairs, explicitly stated that "China has no interest in joining the so-called trilateral negotiations, given the huge gap between the nuclear arsenal of China and those of the U.S. and the Russian Federation."[98] In the eyes of Chinese military strategists, arms control is generally seen as a tool by the strong to keep down the weak.[99] This inherent suspicion is illustrated in the Science of Military Strategy, a core textbook for senior PLA officers, in which arms control is described as a "struggle" between self-interested great powers.[100] Chinese

leaders are particularly suspicious of U.S.-led arms control regimes, which Chinese strategists see as a "trap" designed to solidify U.S. nuclear dominance and undermine China's nuclear deterrent.[101] Indeed, China mostly uses arms control as a notion to protest against other countries' arm deployment and development.

This does not mean progress cannot be made, but U.S. objectives need to shift. First, to support the argument in the deterrence section about instability in conventional deterrence, the United States could consider asymmetric arms control arrangements, such as reductions in U.S. theater missile defense capabilities or even in the number of nuclear warheads, in exchange for demobilization of certain types and numbers of Chinese conventional missiles. Chinese interlocutors have often expressed interest in a U.S. statement of mutual vulnerability. What would make such a concession to China worthwhile to the United States? The United States could maintain that it possesses a strong nuclear capability, and that China would certainly suffer far more than the United States in any nuclear exchange, while also admitting at the same time that the United States is vulnerable to nuclear attack.[102]

China, the United States, and Russia have been focused on developing artificial intelligence (AI), but through different approaches. The Russian projects are directed at creating military hardware which relies on AI but leaves decisions entirely in human hands, while the U.S. approach is also more conservative, with the goal of producing computers that can assist human decisionmaking but not contribute on their own. China has the most aggressive approach, focusing on developing advanced AI that could contribute to strategic decisionmaking. In China's 2017 New Generation Artificial Intelligence Development Plan, which lays out its goal of leading the world in AI by 2030, China aims to have AI systems that can outperform humans in complex, changing environments and that can process more battlefield information than humans. This would give the PLA a substantial advantage over its adversaries that have less ability to utilize information.[103] Despite these lofty goals, much more research and development needs to be done before any existing AI system is advanced enough to advise battlefield operations.

China understands that the proliferation of AI brings new risks and challenges to the global stage and wants to be in charge of setting the norms for this new technology. As such, China's New Generation Artificial Intelligence Development Plan calls on minimizing the risks of AI to ensure a "safe, reliable, and controllable" development of the technology. This includes formulating laws, regulations, ethical norms, and safety mechanisms for AI.[104]

Chinese officials have also expressed concerns about an AI arms race and emphasized the need for international cooperation and potential arms control. PLA scholars have indicated that they are concerned that AI "will lower the threshold of military action" because states may be more willing to attack each other with AI military systems due to lowered casualty risks. Chinese officials have also expressed that they are concerned about increased misperceptions through the use of these systems.[105] China's private sector, which plays a big role in developing a lot of AI systems—for example, Baidu makes autonomous vehicles, Alibaba Cloud is in charge of smart cities, and Tencent makes medical imaging—have also voiced their worries.[106] Jack Ma, the chairman of Alibaba, explicitly stated at the 2019 Davos World Economic Forum that he was concerned that the global competition over AI could lead to war.

There may be more room to maneuver, therefore, to discuss how cyber warfare, counterspace capabilities, or AI-enabled systems could create crisis dynamics that neither side favors, and thus China may be willing to agree to mutual constraints in these areas to protect C2 and otherwise reduce the likelihood of accidents and miscalculation. For instance, the U.S. 2022 Nuclear Posture Review emphasizes the importance of keeping a human in the loop for nuclear employment and decisionmaking.[107] This approach aims to maintain control

and reduce risks associated with AI-driven systems. A general agreement with China on this matter could be useful in promoting transparency, trust, and stability between the United States and China. Given China's concerns about AI arms races, misperceptions, and the potential for conflict, it is possible that it may be open to such an agreement, as it aligns with its security interests.

On space, China has been promoting the Prevention of Placement of Weapons in Outer Space Treaty, which aims to prohibit the placement of weapons in outer space. China supports this treaty to prevent a space arms race.[108] However, the United States opposes the agreement, as it believes the treaty lacks proper verification mechanisms and could potentially limit its ability to defend its space assets. Furthermore, the United States has been advocating for international norms and rules to regulate space activities, while Beijing has expressed reservations about this approach.[109] China's 2013 Science of Military Strategy prefers to argue that "seizing command of space and network dominance will become crucial for obtaining comprehensive superiority on the battlefield and conquering an enemy."[110] Despite these disagreements, reaching a consensus would be challenging but possible. As China and the United States consider space weaponization and threats to space assets, including satellite systems that support nuclear C2 on the ground, agreements on protecting these systems will become critical points for maintaining control over nuclear forces—something of mutual interest to both nations.[111]

In addition to refining which capabilities to control and restrict, U.S. strategists should also consider whether bringing China into bilateral agreements currently in place with Russia is the right strategy. This largely depends on alliance dynamics between China and Russia. If it looks like the two countries might team up to promote their preferred norms, trilaterals may not be superior to two separate bilateral channels. However, if China's participation will impose constraints on Russia or vice versa, or the two countries are so clearly in alignment that they concede deterrence is determined by the balance of U.S. forces against an aggregate of Chinese and Russian nuclear forces (such that then the United States is outnumbered and may have to make some concessions), trilateral and broader multilateral arrangements may be the optimal future modality.

Lastly, China tends to exploit gaps in the international order, making advances at the expense of others when international norms are not solid. Many of the main concepts central to arms control—such as what defines a strategic system, a deployed system, or a tactical nuclear weapon—are debatable. This ambiguity creates space for China to pursue its modernization goals with relatively less pushback and reputational costs. Even if China and the United States cannot agree on force posture, a first step in arms control should be to reach agreement about these fundamental concepts and their meanings and implications.

Conclusion

China's nuclear modernization and buildup requires new thinking on deterrence, force posture, and arms control. However, it is not necessarily the case that the solutions of the past suit the challenges in store for the coming period between 2035 and 2050. A best-case scenario for U.S. and allied security is for Chinese nuclear doctrine and strategy to treat nuclear weapons as only relevant for nuclear deterrence, serving no war fighting use. As the United States considers changing its approach to its own nuclear modernization, extended deterrence, or arms control, a primary question should be how these changes might alter the role of nuclear weapons in China's strategy. This does not need to be a two-peer competition, as this volume posits, but rather the United States could avoid creating a strategic adversary in Beijing altogether. Preventing a more permissive Chinese nuclear strategy should be the top priority of all efforts, even if it means living with a larger, more survivable Chinese nuclear arsenal.

About the Authors

Heather Williams is the director of the Project on Nuclear Issues and a senior fellow in the International Security Program at the Center for Strategic and International Studies (CSIS). Prior to joining CSIS, she was a visiting fellow with the Project on Managing the Atom in the Belfer Center for Science and International Affairs at the Harvard Kennedy School and a Stanton Nuclear Security fellow in the Security Studies Program at MIT. Until 2022, she was a senior lecturer (associate professor) in defense studies at King's College London and taught on arms control, deterrence, and disarmament. From 2018 to 2019, Dr. Williams served as a specialist adviser to the House of Lords International Relations Committee inquiry into the Nuclear Non-Proliferation Treaty and disarmament, and until 2015 she was a research fellow at Chatham House. She previously worked in the Strategy, Forces, and Resources Division at the Institute for Defense Analyses, where she remains an adjunct research staff member. She is an associate fellow at the Royal United Services Institute (RUSI), a senior associate fellow with the European Leadership Network, and a member of the Wilton Park Advisory Council. Dr. Williams has a PhD in war studies from King's College London, an MA in security policy studies from the George Washington University, and a BA in international relations and Russian studies from Boston University.

Kelsey Hartigan is the deputy director of the Project on Nuclear Issues (PONI) and a senior fellow with the International Security Program at the Center for Strategic and International Studies (CSIS). In this role, she is responsible for managing the country's preeminent national program for developing the next generation of nuclear experts. Prior to joining CSIS, Hartigan was dual-hatted as a faculty associate at the Naval Postgraduate School and a senior adviser to the director of the U.S. Special Operations Command Countering Weapons of Mass Destruction Directorate. From 2016 to 2019, she served as a policy adviser on North Korea, weapons of mass destruction crisis response planning, and nuclear proliferation in the Office of the Secretary of Defense for Policy. Before joining the Department of Defense, Hartigan was a senior program officer at the Nuclear Threat Initiative and a nonproliferation and defense analyst at the National Security Network. She has also

held positions with the International Security and Nuclear Weapons Program at the Henry L. Stimson Center and the U.S. Department of State's Delegation to the Conference on Disarmament in Geneva, Switzerland. Hartigan holds an MA from Georgetown University's Edmund A. Walsh School of Foreign Service, where she focused on technology and national security, and a BA from Purdue University.

Lachlan MacKenzie is a program coordinator and research assistant with the Project on Nuclear Issues in the International Security Program at the Center for the Strategic and International Studies (CSIS). Previously, Lachlan worked as an intern with the Institute for the Study of War and the Institute for National Strategic Studies. He graduated from Brown University with an honors BA in international relations focused on Russia.

Robert M. Soofer is a senior fellow in the Forward Defense practice of the Atlantic Council's Scowcroft Center for Strategy and Security, where he leads its Nuclear Strategy Project. He is also an adjunct professor at Georgetown University's Center for Security Studies, teaching courses in nuclear strategy, missile defense, and arms control. He serves as a consultant for the Sandia, Los Alamos, and Lawrence Livermore National Laboratories as well as the Institute for Defense Analyses. Soofer was deputy assistant secretary of defense for nuclear and missile defense policy from April 2017 to January 2021. In this capacity, he was codirector of the Nuclear Posture Review and Missile Defense Review and led their implementation; testified before Congress on nuclear and missile defense policy; led biannual nuclear staff talks with key allies; served as US representative to the NATO High Level Group for nuclear planning; and was the secretary of defense representative to the US-Russia nuclear arms control talks. He taught at the National War College for three years as professor of national-security policy and served for eight years in various policy and international-affairs positions with the Strategic Defense Initiative Organization/Missile Defense Agency. In 2003, he was called to active duty as a lieutenant commander in the Naval Reserve and assigned to the newly created Terrorist Threat Integration Center. Soofer received his doctorate in international relations from the University of Southern California and is a graduate of the National War College.

Thomas Karako is a senior fellow with the International Security Program and the director of the Missile Defense Project at the Center for Strategic and International Studies (CSIS), where he arrived in 2014. His research focuses on national security, missile defense, nuclear deterrence, and public law. In 2010–2011, he was an American Political Science Association congressional fellow, working with the professional staff of the House Armed Services Committee and the Subcommittee on Strategic Forces on U.S. strategic forces policy, nonproliferation, and NATO. Dr. Karako is also currently a fellow with the Institute for Politics and Strategy of Carnegie Mellon University. He received his PhD from Claremont Graduate University and his BA from the University of Dallas.

Oriana Skylar Mastro is a center fellow at Stanford University's Freeman Spogli Institute for International Studies, where her research focuses on Chinese military and security policy, Asia-Pacific security issues, war termination, nuclear dynamics, and coercive diplomacy. She is also the courtesy assistant professor in the political science department at Stanford University and a non-resident Senior Fellow at the American Enterprise Institute. She continues to serve in the United States Air Force Reserve, for which she works as an Individual Mobilization Augmentee (IMA) to the Policy and Posture Branch Chief at INDOPACOM J5, Camp Smith, Hawaii. Prior to her appointment at Stanford in August 2020, Mastro was an assistant professor of security studies at the Edmund A. Walsh School of Foreign Service at Georgetown University. She holds a BA in East Asian studies from Stanford University and an MA and PhD in politics from Princeton University.

Franklin C. Miller is a senior adviser to the International Security Program at the Center for Strategic and International Studies (CSIS). Frank served from January 2001 to March 2005 as a special assistant to President

George W. Bush and as senior director for defense policy and arms control on the National Security Council staff. At the White House he was responsible for a wide range of presidential policy initiatives related to nuclear deterrence policy, strategic arms reductions, national space policy, defense trade reform, land mines, and transforming the U.S. and NATO militaries. He directed interagency support of Operation Enduring Freedom and Operation Iraqi Freedom. During his 31-year career in government, Miller has had unusual influence on the evolution of national deterrence and nuclear targeting policy, as well as on the START 1 and START 2 treaties, and he was instrumental in forging important new relationships with the British. He was deeply involved in improving U.S. capabilities to address biological and chemical weapons threats; in enhancing defense relations with Russia, Ukraine, and Uzbekistan; in building the basis for U.S. and NATO strategic and tactical missile defense programs; in national reconnaissance and space policy; and in submarine operations policy. He has also served as the chair of NATO's nuclear policy committee and of NATO's counterproliferation policy committee.

Leonor Tomero served as the deputy assistant secretary of defense for nuclear and missile defense policy in the Office of the Secretary of Defense from January 2021–October 2021, supporting the under secretary of defense for policy and the assistant secretary of defense for strategy, plans, and capabilities by developing strategies, informing policies, and conducting oversight of nuclear deterrence policy, arms control and missile defense policy. For over a decade, she was House Armed Services Committee Democratic professional staff lead for nuclear deterrence, nuclear weapons, nonproliferation, military space, and missile defense. In that capacity, she had responsibility for drafting and negotiating over 100 provisions and authorizing over $65 billion each year in eleven annual National Defense Authorization Acts, with regard to military space and related intelligence assets, nuclear forces and production capacity, hypersonic missiles, missile defense, nonproliferation, arms control, and nuclear clean-up programs. Prior to joining the committee, she was director of nuclear non-proliferation at the Center for Arms Control and Nonproliferation, responsible for analysis, congressional education, Track II programs, and public and media outreach related to nuclear weapons, nonproliferation, missile defense and space policy. She also served on the congressional staff of Representative Shelley Berkley (D-NV) and Senator Harry Reid (D-NV) working on nuclear waste and environmental issues. Ms. Tomero holds a BA in government from Cornell University, an MA in security studies from Georgetown University and a JD cum laude from American University's Washington College of Law and was a term-member on the Council on Foreign Relations.

Jon Wolfsthal is an adjunct senior fellow at the Center for a New American Security (CNAS). He served from 2014 to 2017 as special assistant to former U.S. president Barack Obama as senior director for arms control and nonproliferation at the National Security Council. In that post, he was the most senior White House official setting and implementing U.S. government policy on all aspects of arms control, nonproliferation, and nuclear policy. Prior to that, he served as the deputy director of the James Martin Center for Nonproliferation Studies at the Monterey Institute for International Studies. From 2009 to 2012, he was the special adviser to then U.S. vice president Joe Biden for nuclear security and nonproliferation and as a director for nonproliferation on the National Security Council. He supported the Obama administration's negotiation and ratification of the New START arms reduction agreement with the Russian Federation, and helped support the development of nuclear policy including through the 2010 Nuclear Posture Review. He was previously a senior fellow at the Center for Strategic and International Studies and, in his first stint at Carnegie, deputy director of the Nuclear Policy Program. He served in several capacities during the 1990s at the U.S. Department of Energy, including an on-the-ground assignment in North Korea from 1995 to 1996.

Endnotes

1 "2021 Space and Missile Defense Symposium." U.S. Strategic Command, 12 Aug. 2021, www.stratcom.mil/Media/Speeches/Article/2742875/2021-space-and-missile-defense-symposium/.

2 Admiral Charles Richard, commander of U.S. Strategic Command, frames it: "By these measures, China is already capable of executing any plausible nuclear employment strategy within their region and will soon be able to do so at intercontinental ranges as well. They are no longer a 'lesser included case' of the pacing nuclear threat, Russia." See: "Statement of Charles A. Richard Commander United States Strategic Command before the Senate Committee on Armed Services," Senate Committee on Armed Services, April 20, 2021, https://www.armed-services.senate.gov/imo/media/doc/Richard04.20.2021.pdf.

3 Department of Defense, *2022 Nuclear Posture Review* (Washington, DC: DOD 2022), 12, https://fas.org/wp-content/uploads/2023/07/2022-Nuclear-Posture-Review.pdf.

4 Ibid., 7.

5 "The US is particularly at risk of being overwhelmed should its military be forced to fight on two or more fronts simultaneously (p. vi)." 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, November 2018), https://www.usip.org/sites/default/files/2018-11/providing-for-the-common-defense.pdf.

6 Scholars have noted that the United States has been planning for two major theater wars since the end of World War II. See Paul D. Miller, "Why we need to move beyond the 'Two War' doctrine," *Foreign Policy,* January 6, 2012, https://foreignpolicy.com/2012/01/06/why-we-need-to-move-beyond-the-two-war-doctrine/.

7 Andrew F. Krepinevich, "The New Nuclear Age," *Foreign Affairs,* April 19, 2022, https://www.foreignaffairs.com/articles/china/2022-04-19/new-nuclear-age.

8 Caitlin Talmadge makes a similar argument in "Multipolar Deterrence in the Emerging Nuclear Era," in Vipin Narang and Scott D. Sagan, eds., *The Fragile Balance of Terror: Deterrence in the New Nuclear Age* (Ithaca, New York: Cornell University Press, 2023).

9 Robert S. McNamara, "McNamara Speech on U.S. Nuclear Strategy," CQ Almanac, September 18, 1967, https://library.cqpress.com/cqalmanac/document.php?id=cqal67-1313223.

10 See, for example, Harold Brown, "Memorandum for the President: Nuclear Targeting Policy Review," Declassified in National Archives 064, document 39, November 28, 1978, https://www.archives.gov/files/declassification/iscap/pdf/2011-002-doc2.pdf.

11 Department of Defense, *Report on the Nuclear Employment Strategy of the United States 2020* (Washington, DC: DOD, 2022), 7, https://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/NCB/21-F-0591_2020_Report_of_the_Nuclear_Employement_Strategy_of_the_United_States.pdf.

12 Michael Kofman and Anya Loukianova Fink, "Escalation management and nuclear employment in Russian military strategy," War on the Rocks, September 19, 2022, https://warontherocks.com/2020/06/escalation-management-and-nuclear-employment-in-russian-military-strategy/; and Abe Denmark and Caitlin Talmadge, "Why China Wants More and Better Nukes," *Foreign Affairs,* November 19, 2021, https://www.foreignaffairs.com/china/why-china-wants-more-and-better-nukes.

13 In other words, why would Russia and China deploy a large non-strategic nuclear force unless they thought it provided an advantage at the regional nuclear level?

14 John R. Harvey and Robert M. Soofer, "Strengthening Deterrence with SLCM-N," Atlantic Council, November 5, 2022, https://www.atlanticcouncil.org/in-depth-research-reports/issue-brief/strengthening-deterrence-with-slcm-n/; and John R. Harvey and Robert M. Soofer, "Strengthening Deterrence With SLCM-N," Real Clear Defense, November 22, 2022, https://www.realcleardefense.com/articles/2022/11/22/strengthening_deterrence_with_slcm-n_866085.html.

15 For a complete explanation of why SLCM-N is the best option, see Harvey and Soofer, "Strengthening Deterrence with SLCM-N"; and Sandy Winnefeld and James N. Miller, "Bring Back the Nuclear Tomahawks," U.S. Naval Institute, *Proceedings* 143, no. 5, May 2017, https://www.usni.org/magazines/proceedings/2017/may/bring-back-nuclear-tomahawks.

16 Department of Defense, *2022 Nuclear Posture Review*, 23.

17 U.S. Congress, House, "Strategic Forces Subcommittee Hearing: FY24 Request for Nuclear Forces and Atomic Energy Defense Activities," Statement of Deborah Rosenblum before the House Armed Services Committee Subcommittee on Strategic Forces, March 28, 2023, https://armedservices.house.gov/hearings/strategic-forces-subcommittee-hearing-fy24-request-nuclear-forces-and-atomic-energy-defense.

18 Fireside chat with Kurt Campbell, coordinator for Indo-Pacific Affairs, The Aspen Institute, December 8, 2022.

19 Harvey and Soofer, "Strengthening deterrence with SLCM-N."

20 Robert Soofer, "Before embarking on arms control talks, Biden needs a nuclear deal with Congress," Atlantic Council, June 14, 2023, https://www.atlanticcouncil.org/blogs/new-atlanticist/before-embarking-on-arms-control-talks-biden-needs-a-nuclear-deal-with-congress/.

21 Jesse Johnson, "Japan should consider hosting U.S. nuclear weapons, Abe says," *Japan Times,* February 27, 2022, https://www.japantimes.co.jp/news/2022/02/27/national/politics-diplomacy/shinzo-abe-japan-nuclear-weapons-taiwan; and Dasl Yoon, "South Korean President says Country could develop nuclear weapons," *Wall Street Journal,* January 12, 2023, https://www.wsj.com/articles/south-korean-president-says-country-could-develop-nuclear-weapons-11673544196.

22 Mallory Shelbourne, "HASC Advances NDAA Authorizing 10 Ships, Creating SLCM-N Program," USNI News, June 22, 2023, https://news.usni.org/2023/06/22/hasc-advances-ndaa-authorizing-10-ships-creating-slcm-n-program.

23 The author would like to thank Thomas Causey, Jerome He, Linda Liu, Kasha Tyranski, and JB Lim for their expert, timely, and comprehensive research assistance.

24 Department of Defense (DOD), *Military And Security Developments Involving the People's Republic Of China 2022* (Washington, DC: November 2022), 94, https://media.defense.gov/2022/Nov/29/2003122279/-1/-1/1/2022-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF.

25 The Headquarter of the Second Artillery [第二炮兵司令部], *The Science of Military Strategy of the Second Artillery* [第二炮兵战略学] (Beijing: Lantian Press [蓝天出版社], 1996), 112-117, 152-161.

26 Ibid.

27 Shou Xiaosong [寿晓松], *The Science of Military Strategy* [战略学] (Beijing: Military Science Press [军事科学出版社], 2013).

28 DOD, *Military and Security Developments Involving the People's Republic of China 2021* (Washington, DC: November 2021), https://media.defense.gov/2021/Nov/03/2002885874/-1/-1/0/2021-CMPR-FINAL.PDF?source=GovDelivery.

29 David Webb, "Dong Feng-21 (CSS-5)," Missile Defense Advocacy Alliance, February 2017, https://missiledefenseadvocacy.org/missile-threat-and-proliferation/todays-missile-threat/china/dong-feng-21-css-5/.

30 DOD, *Military and Security Developments Involving the People's Republic of China 2022,* 98.

31 James M. Lindsay, "China's Nuclear Forces, With Fiona S. Cunningham," Council on Foreign Relations, February 28, 2023, https://www.cfr.org/podcasts/chinas-nuclear-forces-fiona-s-cunningham.

32 "When attending the plenary meeting of the delegation of the People's Liberation Army and the Armed Police Force, Xi Jinping emphasized the realization of a good start in national defense and military construction during the "14th Five-Year Plan" period and celebrated the 100th anniversary of the founding of the Communist Party of China with outstanding results" [习近平在出席解放军和武警部队代表团全体会议时强调 实现"十四五"时期国防和军队建设良好开局 以优异成绩迎接中国共产党建党100周年], Xinhua [新华网], March 9, 2021, https://www.xinhuanet.com/politics/2021-03/09/c_1127191057.htm

33 Tong Zhao, "What's Driving China's Nuclear Buildup?," Carnegie Endowment for International Peace, August 5, 2021, https://carnegieendowment.org/2021/08/05/what-s-driving-china-s-nuclear-buildup-pub-85106.

34 Li Tilin [李体林], "Creative Development of the Nuclear Strategic Theory of China since the Reform and Opening-up" [改革开放以来中国核战略理论的发展], *China Military Science* [中国军事科学], no. 6 (2008): 42.

35 Ibid., 42.

36 Charles A. Richard, "Open/Closed: Hearing Title to Receive Testimony on United States Strategic Command and United States Space Command in Review of the Defense Authorization Request for Fiscal Year 2023 and the Future Years Defense Program," Statement before the Senate Committee on Armed Services, March 8, 2022, https://www.armed-services.senate.gov/imo/media/doc/2022%20USSTRATCOM%20Posture%20Statement%20-%20SASC%20Hrg%20FINAL.pdf.

37 Matt Korda and Hans Kristensen, "China is Building A Second Nuclear Missile Silo Field," Federation of American Scientists, July 26, 2021, https://fas.org/publication/china-is-building-a-second-nuclear-missile-silo-field/.

38 Department of Defense, *Military and Security Developments Involving the People's Republic of China 2022,* 167.

39 Toshi Yoshihara, "What China's Strategic Breakout Means for the U.S.," (speech, Heritage Foundation, November 9, 2022), https://www.heritage.org/defense/event/what-chinas-strategic-breakout-means-the-us.

40 Robert S. Norris and Hans M. Kristensen, "Global Nuclear Weapons Inventories, 1945-2010," *Bulletin of the Atomic Scientists* 66, no. 4 (July 2010): 77–83, doi:10.2968/066004008. Contemporary U.S. strategists, like chief of naval operations Admiral Arleigh Burke, retired Army chief of staff General Maxwell Taylor, and former secretary of defense Robert McNamara also thought fewer weapons were needed. "Nuclear Weapons: Who Has What At A Glance," Arms Control Association, August 2020, https://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat.

41 Hans Kristensen et al., "Status of World Nuclear Forces," Federation of American Scientists, March 31, 2023, https://fas.org/initiative/status-world-nuclear-forces/. Exact estimates of the size of the U.S. nuclear arsenal vary slightly across sources. Analysts agree that there are about 3,800 active warheads in the military stockpile but range the number of retired warheads awaiting dismantlement from 1,750 to 2,000, which explains the variance in the total number.

42 About 43 percent of the Russian force is land-based. See "How is China Modernizing its Nuclear Forces?," *China Power,* CSIS, updated October 28, 2020, https://chinapower.csis.org/china-nuclear-weapons/.

43 Kristensen and Korda, "Status of World Nuclear Forces."

44 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), https://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR392/RAND_RR392.pdf.

45 Peter Wood and Alex Stone, "China's Ballistic Missile Industry," China Aerospace Studies Institute, May 11, 2021, https://www.airuniversity.af.edu/Portals/10/CASI/documents/Research/PLARF/2021-05-11%20Ballistic%20Missile%20Industry.pdf?ver=Y3oJa8Z9eK2rpAO9tQGCcQ%3D%3D.

46 Luke Caggiano, "China Deploys New Submarine-Launched Ballistic Missiles," Arms Control Association, May 2023, https://www.armscontrol.org/act/2023-05/news/china-deploys-new-submarine-launched-ballistic-missiles.

47 "U.S. and Allied Ballistic Missile Defenses in the Asia-Pacific Region," Arms Control Association, January 2019, https://www.armscontrol.org/factsheets/us-allied-ballistic-missile-defenses-asia-pacific-region.

48 "U.S. Experts: America Expands Network of Missile Defense in Asia, Targeting North Korea Explicitly and China Implicitly" [美专家：美扩展亚洲导弹防御网 明指朝鲜暗指中国], Phoenix Media [凤凰网], August 24, 2012, http://phtv.ifeng.com/program/comment/detail_2012_08/24/17064804_0.shtml; and "U.S. Attempts to Increase Deployment of 'Territorial Defense Radars' in Asia-Pacific; Sharp Comment: This Is Planting Mines for Regional Security" [美国欲在亚太增加部署"国土防御雷达" 锐评：这是借机为地区安全埋雷], *China Military* [中国军网], March 15, 2019, http://www.81.cn/gjzx/2019-03/15/content_9451030.htm.

49 "Foreign Experts Claim Distribution of Nuclear Weapons Around China Is Densest in the World" [外国专家称中国周边核武器分布密度全球最高], CCTV [央视网], August 18, 2009, https://www.cctv.com/viponline/special/zhilingqianyan/20090818/103077.shtml. For Chinese scholarly analysis on the increased nuclear armament in China's vicinities, see Cheng Xiaoyong [程晓勇], "On China's Peripheral Nuclear Situation after the Cold War: Two Opposing Trends and Their Origins" [冷战后中国周边核态势的两种趋向及其原因解

析], *Teaching and Research* [教学与研究], no. 3 (2013): 80–89.

50 Department of Defense, *Military and Security Developments Involving The People's Republic of China 2022,* 64–67.

51 Shou, *The Science of Military Strategy,* 171.

52 Jessie Yeung, "China claims successful anti-ballistic missile interceptor test," CNN, June 20, 2022, https://www.cnn.com/2022/06/19/china/china-anti-ballistic-missile-test-intl-hnk/index.html.

53 "China says conducted mid-course missile interception test," AP News, April 15, 2023, https://apnews.com/article/china-interceptor-missile-test-defense-c77ae53a43f5e74bc48c4be45e46af80.

54 Yeung, "China claims successful anti-ballistic missile interceptor test."

55 Hans M. Kristensen, Testimony before the U.S.-China Economic and Security Review Commission, June 11, 2021, 1–2, https://www.uscc.gov/sites/default/files/2021-06/Hans_Kristensen_Testimony.pdf.

56 Hans M. Kristensen and Matt Korda, "Nuclear Notebook: Chinese nuclear forces, 2021," *Bulletin of the Atomic Scientists*, November 15, 2021, https://thebulletin.org/premium/2021-11/nuclear-notebook-chinese-nuclear-forces-2021/.

57 Department of Defense, *Military and Security Developments Involving the People's Republic of China 2020* (Washington, DC: DOD, 2020), 55, https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF.

58 Anil Chopra et al., *Indian Defence Review (Jul-Sep 2018)* (Lancer Publishers, August 2018).

59 Anthony H. Cordesman and Joseph Kendall, *Chinese Strategy and Military Modernization in 2016: A Comparative Analysis* (Washington, DC: CSIS, 2016), 427–53, https://www.csis.org/analysis/chinese-strategy-and-military-modernization-2016.

60 Zhang Jiadong [张家栋], "Why would America hype up 'China's hypersonic weapon'?" [美国为何热炒'中国高超音速武器'], *Global Times* [环球时报], October 22, 2021, https://opinion.huanqiu.com/article/45GcOxgUZmq.

61 Minnie Chan, "China boosts nuclear strike capability in face of growing rivalry with US, report says," *South China Morning Post,* December 11, 2020, https://www.scmp.com/news/china/military/article/3113639/china-boosts-nuclear-strike-capability-face-growing-rivalry-us.

62 Minnie Chan, "Chinese military beefs up coastal forces as it prepares for possible invasion of Taiwan," *South China Morning Post,* October 18, 2020, https://www.scmp.com/news/china/diplomacy/article/3105953/chinese-military-beefs-coastal-forces-it-prepares-possible.

63 Xiao Tianliang [肖天亮] ed., *The Science of Military Strategy* [战略学] (Beijing: National University of Defense Technology Press [国防大学出版社], 2015), 126–128.

64 John Lewis Gaddis, *Strategies of Containment: A Critical Appraisal of American National Security Policy During the Cold War, Revised and Expanded Edition* (New York: Oxford University Press, 2005).

65 Ibid.

66 Fiona S. Cunningham and M. Taylor Fravel, "Dangerous Confidence? Chinese Views on Nuclear Escalation," *International Security* 44, no. 2 (2019): 61–109, doi:10.1162/isec_a_00359.

67 Jeffrey Lewis, "Minimum Deterrence," *Bulletin of the Atomic Scientist* 64, no. 3 (2008): 38–41, doi:10.2968/064003008; and Alastair Iain Johnston, "China's New 'Old Thinking': The Concept of Limited

Deterrence," *International Security* 30, no. 3 (1995): 5–42, doi:10.2307/2539138.

68 "DF-31," in *IHS Jane's Weapons: Strategic 2015-2016*, ed. James C. O'Halloran (London: IHS, 2015), 18–21; Wood and Stone, "China's Ballistic Missile Industry"; and John W. Lewis and Hua Di, "China's Ballistic Missile Programs: Technologies, Strategies, Goals," *International Security* 17, No. 2 (Fall 1992): 5–40, doi:10.2307/2539167.

69 Hans Kristensen and Robert S. Norris, "Chinese Nuclear Forces," *Bulletin of the Atomic Scientists* 72, no. 4 (2016): 205–211, doi:10.1177/0096340215591247.

70 Charles L. Glaser and Steve Fetter, "Should the United States reject MAD? Damage limitation and US nuclear strategy toward China," *International Security* 41, no. 1 (2016): 71, doi:10.1162/ISEC_a_00248; and Wu Riqiang, "Survivability of China's Sea-Based Nuclear Forces," *Science and Global Security* 19, no. 2 (2011): 91–120, doi:10.1080/08929882.2011.586312.

71 Wu, "Survivability of China's Sea-Based Nuclear Forces."

72 Li Bin, "Tracking Chinese Strategic Mobile Missiles," *Science and Global Security* 15, no. 1 (2007): 1–30, doi:10.1080/08929880701350197. Glaser and Fetter think it would be more difficult. Glaser and Fetter, "Should the United States reject MAD?"

73 Cunningham and Fravel, "Dangerous Confidence?"

74 Burgess Laird, *War Control: Chinese Writings on the Control of Escalation in Crisis and Conflict* (Washington, DC: Center for a New American Security, April 2017), https://www.cnas.org/publications/reports/war-control.

75 Oriana Skylar Mastro, "Nuclear Deterrence and the US–China Strategic Relationship," in *Alliances, Nuclear Weapons and Escalation: Managing Deterrence in the 21st Century,* eds. Stephan Frühling and Andrew O'Neil (Canberra, Australia: ANU Press, 2021), 25–39, https://press-files.anu.edu.au/downloads/press/n9294/pdf/book.pdf.

76 C. Todd Lopez, "U.S. Withdraws From Intermediate-Range Nuclear Forces Treaty," U.S. Department of Defense, August 2, 2019, https://www.defense.gov/News/News-Stories/Article/Article/1924779/us-withdraws-from-intermediate-range-nuclear-forces-treaty/; and Clive Wiliams, "Pacific Collateral from the INF Treaty Collapse," Lowy Institute, *The Interpreter,* January 31, 2019, https://www.lowyinstitute.org/the-interpreter/pacific-collateral-inf-treaty-collapse.

77 Idrees Ali, "U.S. to scrap sea-launched nuclear missile despite military backing," Reuters, October 27, 2022, https://www.reuters.com/world/us/us-scrap-sea-launched-nuclear-missile-despite-military-backing-2022-10-27/.

78 Sebastien Roblin, "Guam-Killer: China's DF-26 Ballistic Missile Could Be Even More Deadly If Armed With Nuclear Warheads," *The National Interest*, July 17, 2020, https://nationalinterest.org/blog/reboot/guam-killer-chinas-df-26-ballistic-missile-could-be-even-more-deadly-if-armed-nuclear.

79 Eugene Saad and Adam Mount, *Air-Launched Ballistic Missiles* (Washington, DC: Federation of American Scientists, 2019), https://uploads.fas.org/2019/11/FAS-ALBM.pdf.

80 David Lague and Benjamin Kang Lim, "New missile gap leaves U.S. scrambling to counter China," Reuters, April 25, 2019, https://www.reuters.com/investigates/special-report/china-army-rockets/.

81 "DF-17," *Missile Threat,* CSIS, August 2, 2021, https://missilethreat.csis.org/missile/df-17/.

82 Scott Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993).

83 Zachary Keck, "The U.S. Will Trade Seattle for Seoul," *Foreign Policy,* October 17, 2022, https://foreignpolicy.com/2022/10/17/south-korea-nuclear-weapons-deterrence-france-cold-war-north-korea-threat/; and Lee Baek-soon, "Is Seoul any safer than Paris?," Korea JoonAng Daily, July 12, 2022, https://koreajoongangdaily.joins.com/2022/07/12/opinion/columns/North-Korea-nuclear-umbrella-ICBM/20220712195236005.html?detailWord.

84 Stephen Herzog and Lauren Sukin, "The Dueling Nuclear Nightmares Behind the South Korean President's Alarming Comments," Carnegie Endowment for International Peace, Commentary, January 25, 2023, https://carnegieendowment.org/2023/01/25/dueling-nuclear-nightmares-behind-south-korean-president-s-alarming-comments-pub-88879.

85 Toby Dalton et al., *Thinking Nuclear: South Korean Attitudes on Nuclear Weapons* (Chicago: Chicago Council on Global Affairs, February 2022), https://globalaffairs.org/research/public-opinion-survey/thinking-nuclear-south-korean-attitudes-nuclear-weapons.

86 Rupert Wingfield-Hayes, "Will Ukraine invasion push Japan to go nuclear?," BBC News, March 26, 2022, https://www.bbc.com/news/world-asia-60857346.

87 Sayuri Romei, "The Legacy of Shinzo Abe: a Japan Divided about Nuclear Weapons," *Bulletin of the Atomic Scientists*, August 24, 2022, https://thebulletin.org/2022/08/the-legacy-of-shinzo-abe-a-japan-divided-about-nuclear-weapons/.

88 Japanese Ministry of Defense, *National Defense Strategy* (Tokyo: Japanese Ministry of Defense, December 2022), trans. Japanese Ministry of Defense, 3–7, https://www.mod.go.jp/j/approach/agenda/guideline/strategy/pdf/strategy_en.pdf.

89 John Grady, "Australia Developing New Defense Strategy in Response to China, Says Deputy Prime Minister," USNI News, July 12, 2022, https://news.usni.org/2022/07/12/australia-developing-new-defense-strategy-in-response-to-china-says-deputy-prime-minister.

90 Andrew Greene, "Australia may need to consider nuclear weapons to counter China's dominance, defence analyst says," ABC News, July 1, 2019, https://www.abc.net.au/news/2019-07-02/australia-submarine-aircraft-defence-spending-china-dominance/11269412.

91 "Acquiring nuclear weapons," Lowy Institute Poll, 2022, https://poll.lowyinstitute.org/charts/acquiring-nuclear-weapons/.

92 Joseph S. Nye Jr., "Arms Control and International Politics," *Daedalus* 120, no. 1 (1991): 145–65, https://www.jstor.org/stable/20025361.

93 Evan S. Medeiros, *Reluctant Restraint: The Evolution of China's Nonproliferation Policies and Practices, 1980-2004* (Stanford, CA: Stanford University Press, 2007).

94 Alastair Iain Johnston, *Social States: China in International Institutions, 1980-2000* (Princeton, NJ: Princeton University Press, 2008): xxi.

95 David Santoro, "Getting Past No: Developing a Nuclear Arms Control Relationship with China," *Journal for Peace and Nuclear Disarmamen*t 6, no. 1 (2023), 76, doi:10.1080/25751654.2023.2221830.

96 Tang Yongsheng [唐永胜] Ed., *On National Competitive Strategy* [国家竞争战略论] (Beijing: Current Affairs Press [时事出版社], 2018), 241–42.

97 "China's National Defense in 2010" [2010年中国的国防], The State Council Information Office of the People's Republic of China [中华人民共和国国务院新闻办公室], March 31, 2011, http://www.gov.cn/zhengce/2011-03/31/content_2618567.htm; and "Statement by H.E. Amb. LI Song on Nuclear Non-Proliferation at the Tenth NPT Review Conference," Ministry of Foreign Affairs of the People's Republic

of China, August 10, 2022, https://www.fmprc.gov.cn/eng/wjb_663304/zzjg_663340/jks_665232/kjfywj_665252/202208/t20220810_10738694.html.

98 Steven Jiang and Ben Westcott, "China says it won't join nuclear talks until the US reduces its arsenal," CNN, July 8, 2020, https://www.cnn.com/2020/07/08/asia/china-us-nuclear-treaty-intl-hnk/index.html.

99 Yin Chengde, "The New US-Russia Nuclear Disarmament Treaty and the Myth of 'Nuclear-Free' World [美俄核裁军新条约与'无核世界'神话], " CNKI [中国知网], https://global.cnki.net/KCMS/detail/detail.aspx?dbcode=CJFQ&dbname=CJFD2010&filename=GJWY201004004&v=MDAwNDFyQ1VSN3VmWWVkbkZ5M2dVN3ZLSWlmY2Q3RzRIOUhNcTQ5RllJUjhlWDFMdXhZUzdEaDFUM3FUcldNMUY=.

100 Shou, *The Science of Military Strategy*, 177.

101 Li Bin, "Will U.S. Nuclear Posture See a Return to Hegemony?," *Global Times*, January 24, 2018, https://carnegieendowment.org/2018/01/26/will-us-nuclear-posture-review-see-return-to-hegemony-pub-75359; and Ling Shengli, "Does the U.S. Know 'Absolute Security' Doesn't Exist?," *PLA Daily*, February 14, 2019, http://eng.chinamil.com.cn/view/2019-02/14/content_9426859.htm.

102 Matthew Kroenig, *Deterring Chinese Strategic Attack: Grappling with the Implications of China's Strategic Forces Buildup* (Washington, DC: Atlantic Council, November 2021), https://www.atlanticcouncil.org/wp-content/uploads/2021/11/Deterring_Chinese_Strategic_Attack_Rpt_10312190.pdf.

103 Adrian Pecotic, "Whoever Predicts the Future Will Win the AI Arms Race," *Foreign Policy,* March 5, 2019, https://foreignpolicy.com/2019/03/05/whoever-predicts-the-future-correctly-will-win-the-ai-arms-race-russia-china-united-states-artificial-intelligence-defense/.

104 Graham Webster et al., "China's Plan to 'Lead' in AI: Purpose, Prospects, and Problems," New America, August 1, 2017, https://www.newamerica.org/cybersecurity-initiative/blog/chinas-plan-lead-ai-purpose-prospects-and-problems/

105 Gregory C. Allen, *Understanding China's AI Strategy: Clues to Chinese Strategic Thinking on Artificial Intelligence and National Security* (Washington, DC: Center for a New American Security, February 2019), https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Understanding-Chinas-AI-Strategy-Gregory-C.-Allen-FINAL-2.15.19.pdf?mtime=20190215104041.

106 Michael C. Horowitz et al., *Strategic Competition in an Era of Artificial Intelligence* (Washington, DC: Center for a New American Security, July 2018), https://s3.amazonaws.com/files.cnas.org/documents/CNAS-Strategic-Competition-in-an-Era-of-AI-July-2018_v2.pdf?mtime=20180716122000.

107 Paul K. Kerr, "2022 Nuclear Posture Review," Congressional Research Service, IF12266, December 6, 2022, https://crsreports.congress.gov/product/pdf/IF/IF12266.

108 "China and Russia jointly submitted the draft Treaty on PPWT to the Conference on Disarmament," Ministry of Foreign Affairs of the People's Republic of China, February 12, 2008, https://www.fmprc.gov.cn/mfa_eng/wjb_663304/zzjg_663340/jks_665232/jkxw_665234/200802/t20080212_599177.html.

109 Nicky C. Cardenas, "Military Competition between the United States and China in the South China Sea," Marine Corps University, December 18, 2020, https://www.usmcu.edu/Outreach/Marine-Corps-University-Press/Expeditions-with-MCUP-digital-journal/Military-Competition-between-the-United-States-and-China-in-the-South-China-Sea/.

110 "China Regional Snapshot: Space," House Foreign Affairs Committee, November 14, 2022, https://foreignaffairs.house.gov/china-regional-snapshot-space/.

111 Marie Villarreal Dean, "U.S. Space-Based Nuclear Command and Control: A Guide," *Aerospace Security,* CSIS, January 13, 2023, https://aerospace.csis.org/u-s-space-based-nuclear-command-and-control-a-guide/.

112 Ashton B. Carter, "Nuclear Deterrence: Still the Bedrock of US Security," *American Interest,* April 6, 2017, https://www.the-american-interest.com/2017/04/06/nuclear-deterrence-still-the-bedrock-of-us-security/.

113 The White House, *National Security Strategy* (Washington, DC: October 2022), 8, content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf.

114 Scowcroft Commission, *The Report of the President's Commission on Strategic Forces* (Washington, DC: April 1983), 2-3, https://web.mit.edu/chemistry/deutch/policy/1983-ReportPresCommStrategic.pdf.

115 U.S. Department of Defense, *Nuclear Posture Review* (Washington, DC: February 2018), 51, https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF.

116 Ibid.

117 Leticia Y. Barela et al., *Evolving the Nuclear Security Enterprise: A Report of the Enhanced Mission Delivery Initiative* (Washington, DC: U.S. Department of Energy, September 2022), 3, https://www.lasg.org/MPF2/documents/EvolvingNuclearSecurityEnterprise_Sep2022.pdf.

118 None of this is meant to criticize the superb leadership being provided to the NNSA by its current administrator Jill Hruby and deputy administrator Frank Rose, nor is it meant to reflect poorly on the heroic efforts of former administrator Lisa Gordon Haggerty, who persevered in getting the NNSA's budget increased in the face of opposition from the then secretary of energy and the Office of Management and Budget. Franklin C. Miller and Tim Morrison, "After 20 Years, Let the NNSA Stand on Its Own," Real Clear Defense, September 18, 2020, https://www.realcleardefense.com/articles/2020/09/18/after_20_years_let_the_nnsa_stand_on_its_own_577863.html.

119 Norman R. Augustine et al. *A New Foundation for the Nuclear Enterprise: Report of the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise* (Washington, DC: 2014), http://cdn.knoxblogs.com/atomiccity/wp-content/uploads/sites/11/2014/12/Governance.pdf.

120 Yonhap reported that a recent poll suggests that over 60 percent of South Koreans support developing an independent nuclear deterrent. The same poll suggests the same approximate number support the return of U.S. nuclear weapons to South Korea. Yi Wonju, "Over 60 pct of S Koreans support own nuclear armament," Yonhap News Agency, April 6, 2023, https://en.yna.co.kr/view/AEN20230406010300325.

121 The Australian Labour Party, now in government, has supported the idea that Canberra should sign the Treaty on the Prohibition of Nuclear Weapons. If Australia does follow through on this platform and campaign pledge, it is possible that an extremely adverse reaction in the U.S. Congress could scupper the recently signed AUKUS agreement and significantly damage U.S. extended deterrence efforts in the Asia-Pacific region.

122 The Helsinki Final Act; the Budapest Accord; the Istanbul Agreement, the Presidential Nuclear Initiatives of 1991 and 1992; the Open Skies treaty; the Vienna Document; the INF treaty; the Chemical Weapons Convention; and New START. It also is likely violating the Biological Weapons Convention.

123 Devising a verification regime required for tactical and theater-range nuclear weapons (particularly those carried aboard so-called "general purpose" submarines) would be extremely challenging. The author has no immediate proposals to offer in this regard. Furthermore, if Russia declares that none of its short- and medium-range nuclear weapons are deployed, this entire approach will fail.

124 Idrees Ali and Phil Stewart, "China likely to have 1,500 nuclear warheads by 2035: Pentagon," Reuters, November 29, 2022, https://www.reuters.com/world/china-likely-have-1500-nuclear-warheads-by-2035-pentagon-2022-11-29/.

125 Department of Defense, *Military and Security Developments Involving the People's Republic of China 2021* (Washington, DC: DOD, 2021), https://media.defense.gov/2022/Nov/29/2003122279/-1/-1/1/2022-MILITARY-

AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF.

126 Guy Faulconbridge, "Russians moves ahead with tactical nukes deployment in Belarus," Reuters, May 26, 2023, https://www.reuters.com/business/aerospace-defense/russia-belarus-sign-document-tactical-nuclear-weapon-deployment-belarus-2023-05-25/.

127 Anton Troianovki and Valerie Hopkins, "Putin Raises Stakes in the War, With Direct Challenge to the West," *New York Times*, September 21, 2022, https://www.nytimes.com/2022/09/21/world/europe/putin-ukraine-russia-nuclear.html.

128 "Factbox: Moscow-Beijing partnership has 'no limits'," Reuters, February 4, 2022, https://www.reuters.com/world/china/moscow-beijing-partnership-has-no-limits-2022-02-04/.

129 See, for example, Lindsay Maizland, "China and Russia: Exploring Ties Between Two Authoritarian Powers," Council on Foreign Relations, updated June 14, 2022, https://www.cfr.org/backgrounder/china-russia-relationship-xi-putin-taiwan-ukraine; and Evelyn Cheng, "Russia and China Affirm Economic Cooperation for the Next Several Years," CBNC, March 22, 2023, https://www.cnbc.com/2023/03/22/china-and-russia-affirm-multi-year-economic-cooperation.html.

130 Simone McCarthy, "No Path To Peace: Key Takeaways from Xi and Putin's Talks in Moscow," CNN, March 22, 2023, https://edition.cnn.com/2023/03/22/europe/china-xi-russia-putin-talks-five-takeaways-intl-hnk-mic/index.html; and Jonathan Tirone, "China's Imports of Russian Uranium Spark Fear of New Arms Race," Bloomberg, February, 28, 2023, https://www.bloomberg.com/news/articles/2023-03-01/china-nuclear-trade-with-russia-risks-tipping-military-balance#xj4y7vzkg.

131 Admiral Charles Richard, Testimony before the Senate Armed Service Committee, March 8, 2022, https://www.stratcom.mil/Media/Speeches/Article/2960836/usstratcom-and-usspacecom-sasc-testimony/. "Today's nuclear force is the minimum required to achieve our national strategy. . . . We do not necessarily have to match a weapon for weapon, right? The key is do you have enough capability to execute your strategy. . . . What we have today is the absolute minimum. And we're going to have to ask ourselves, what additional capability . . . and posture do we need to do based on where the threat is going?" U.S. Congress, Senate, "Hearing to Receive Testimony on United States Strategic Command and United States Space Command in Review of the Defense Authorization Request for Fiscal Year 2023 and the Future Years Defense Program," Senate Armed Service Committee, March 8, 2022, https://www.armed-services.senate.gov/imo/media/doc/22-08_03-08-2022.pdf.

132 See, for example, "Rogers Statement on Russia Suspending Participation in New START," House Armed Services Committee, February 21, 2023, https://armedservices.house.gov/news/press-releases/rogers-statement-russia-suspending-participation-new-start; see also Center for Global Security Research, *China's Emergence as a Second Nuclear Peer: Implications for U.S. Nuclear Deterrence Strategy* (Livermore, CA: Lawrence Livermore National Laboratory, March 2023), https://cgsr.llnl.gov/content/assets/docs/CGSR_Two_Peer_230314.pdf (The report recommended new U.S. low-yield capabilities such as the SLCM-N, preparing to deploy nonstrategic nuclear weapons in the Pacific and increasing the numbers of nuclear weapons to meet future deterrence requirements.)

133 Department of Defense, Defense Space Strategy Summary (Washington, DC: DOD, June 2020), https://media.defense.gov/2020/Jun/17/2002317391/-1/-1/1/2020_DEFENSE_SPACE_STRATEGY_SUMMARY.PDF.

134 U.S. Defense Intelligence Agency, *Challenges to Security in Space: Space Resilience in an Era of Competition and Expansion* (Washington, DC: DIA, March 2022), https://www.dia.mil/Portals/110/Documents/News/Military_Power_Publications/Challenges_Security_Space_2022.pdf. See also Antony Blinken, "Russia Conducts Destructive ASAT Test," Department of State, November 15, 2021, https://www.state.gov/russia-conducts-destructive-anti-satellite-missile-test/ (noting that the Russian test of an ASAT in November 2021 created thousands of pieces of dangerous debris).

135 Department of Defense, *Defense Space Strategy Summary*.

136 U.S. Congress, Senate, "Military Space Policy," Statement by Secretary Heather A. Wilson, General L. Goldfein, and General John W. Raymond, Department of the Air Force, May 17, 2017, https://www.armed-services.senate.gov/imo/media/doc/Wilson-Goldfein-Raymond-Greaves_05-17-17.pdf; and "NATO's approach to space," NATO, May 23, 2023, https://www.nato.int/cps/en/natohq/topics_175419.htm.

137 National Intelligence Council, *Global Trends 2040: A More Contested World* (Washington, DC: Office of the Director of National Intelligence, March 2021), https://www.dni.gov/index.php/gt2040-home/emerging-dynamics/international-dynamics.

138 See, for example, Emerson T. Brooking and P.W. Singer, *Like War: The Weaponization of Social Media* (Boston: Eamon Dolan/Houghton Mifflin, 2018).

139 Jack Weinstein, "POV: America's Greatest National Security Threat," BU Today, June 3, 2021, https://www.bu.edu/articles/2021/pov-americas-greatest-national-security-threat/.

140 Rebecca Hersman, "Wormhole Escalation in the New Nuclear Age," *Texas National Security Review* (Summer 2020): 90–109, doi:10.26153/tsw/1022.

141 Heather Williams, (presentation, Director's Strategic Resilience workshop, Los Alamos National Laboratory, March 23–24, 2023).

142 See, for example, "False Warnings of Soviet Missile Attacks Put U.S. Forces on Alert in 1979-1980," National Security Archive, March 16, 2020, https://nsarchive.gwu.edu/briefing-book/nuclear-vault/2020-03-16/false-warnings-soviet-missile-attacks-during-1979-80-led-alert-actions-us-strategic-forces; Francine Uenuma, "The 1983 Military Drill That Nearly Sparked Nuclear War With the Soviets," *Smithsonian Magazine*, April 27, 2022, https://www.smithsonianmag.com/history/the-1983-military-drill-that-nearly-sparked-nuclear-war-with-the-soviets-180979980/; and "A Close Call: The Norwegian rocket incident," PBS, n.d., https://www.pbs.org/wgbh/pages/frontline/shows/russia/closecall/.

143 Henry Kissinger, Eric Schmidt, and Daniel Huttenlocher, *The Age of AI* (New York: Hatchette Book Group, 2021).

144 See, for example, Jim Cooper, "Updating Space Doctrine: How to avoid World War III," War on the Rocks, July 23, 2021, https://warontherocks.com/2021/07/updating-space-doctrine-how-to-avoid-world-war-iii/.

145 Kissinger, Schmidt, and Huttenlocher, *The Age of AI*.

146 Hersman, "Wormhole Escalation."

147 "Remarks by Deputy Secretary Carter at the Cooperative Threat Reduction Symposium at National Defense University, Washington, D.C." U.S. Department of Defense. Accessed September 19, 2023. https://content.govdelivery.com/accounts/USDOD/bulletins/60257c.

148 Section 1644 of the National Defense Authorization Act of FY 2022 mandating a Review of Safety, Security, And Reliability of Nuclear Weapons and Related Systems states the following: (1) . . . options and recommendations for technical, procedural, and policy measures that could strengthen safeguards, improve the security and reliability of digital technologies, and prevent cyber-related and other risks that could lead to the unauthorized or inadvertent use of nuclear weapons as the result of an accident, misinterpretation, miscalculation, terrorism, unexpected technological breakthrough, or deliberate act. (2) Options and recommendations for nuclear risk reduction measures, focusing on confidence building and predictability that the United States could carry out alone or with near-peer adversaries to strengthen safeguards against the unauthorized or inadvertent use of a nuclear weapon and to reduce nuclear risks"; See full text at https://www.congress.gov/bill/117th-congress/senate-bill/1605/text.

149 See, for example, the U.S. Strategic Command mission statement noting that "USSTRATCOM deters strategic attack through a safe, secure, effective, and credible, global combat capability and, when directed, is ready to prevail in conflict," distinguishing the mission of deterrence and prevailing in conflict if deterrence fails. "Mission," U.S. Strategic Command, n.d., https://www.stratcom.mil/About/Mission/itself/.

150 "Transparency in the U.S. Nuclear Weapons Stockpile," National Nuclear Security Administration, October 6, 2021, https://www.energy.gov/sites/default/files/2021-10/20211006%20-%20U.S.%20Nuclear%20Stockpile%20Fact%20Sheet.pdf

151 Jeffrey Lewis, "Minimum Deterrence," *The Bulletin of Atomic Scientists* 63, no. 3 (July 2008), doi:10.2968/064003008.

152 See, for example, DOD, *2018 Nuclear Posture Review* (Washington, DC: DOD 2018), https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF, noting "the perception of an exploitable 'gap' in U.S. regional deterrence capabilities."

153 See, for example, Office of the Under Secretary of Defense, *Nuclear Matters Handbook* (Washington, DC: DOD, 2020), Chapter 4, https://www.acq.osd.mil/ncbdp/nm/NMHB2020rev/chapters/chapter4.html.

154 See, for example, Amy F. Woolf, *Nonstrategic Nuclear Weapons,* CRS Report No. RL32572 (Washington, DC: Congressional Research Service, March 2022), 42, https://crsreports.congress.gov/product/pdf/RL/RL32572.

155 Because of the bomber counting rule under New START, the deployed number of nuclear weapons exceeds 1,550.

156 "President Biden warns Vladimir Putin not to use nuclear weapons: 'Don't. Don't. Don't.'," CBS News, September 16, 2022, https://www.cbsnews.com/news/president-joe-biden-vladimir-putin-60-minutes-2022-09-16/.

157 Adam Smith, Reflections on US defense policy from Rep. Adam Smith, Brookings, January 11, 2023, https://www.brookings.edu/events/reflections-on-u-s-defense-policy-from-the-honorable-adam-smith/.

158 Brown, Charles Q. , and David H. Berger. 2021. "Redefine Readiness or Lose." War on the Rocks, March 15, 2021. https://warontherocks.com/2021/03/redefine-readiness-or-lose/.

159 Eric Schmidt, "Innovation Power: Why technology will define the future of Geopolitics," *Foreign Affairs,* March/April 2023, https://www.foreignaffairs.com/united-states/eric-schmidt-innovation-power-technology-geopolitics.

160 Marc Andreesen, "Why Software is Eating the World," *Wall Street Journal,* August 20, 2011, https://a16z.com/2011/08/20/why-software-is-eating-the-world/.

161 Trae Stephens, "Rebooting the Arsenal of Democracy," War on the Rocks, June 6, 2022, https://warontherocks.com/2022/06/rebooting-the-arsenal-of-democracy/.

162 Dina Temple-Raston and Will Jarvis, "Gilman Louie and the Dance with Wolf Warriors," The Record, June 13, 2022, https://therecord.media/gilman-louie-and-the-dance-with-wolf-warriors.

163 See, for example, Jessica Cox and Heather Williams, "The Unavoidable Technology: How Artificial Intelligence Can Strengthen Strategic Stability," *Washington Quarterly* 44, no. 11 (March 2021), doi:10.1080/0163660X.2021.1893019.

164 Schmidt, "Innovation Power."

165 Shreeya Aranake, "Military Lagging in Data Processing Capabilities," *National Defense Magazine*, April 25, 2022, https://www.nationaldefensemagazine.org/articles/2022/4/25/progress-on-military-data-processing-capabilities-continue-to-lag. See also U.S. Congress, House, Statement by General Glen D. VanHerck before the House Armed Services Committees Strategic Forces Subcommittee, March 8, 2023, https://armedservices.house.gov/sites/republicans.armedservices.house.gov/files/NNC_FY23%20Posture%20Statement%20%20HASC%20SF%20FINAL.pdf. (This notes "the United States and Canada's joint commitment to improving global domain awareness, modernizing command and control systems to provide faster, better-informed decision making, and continuing collaborative research, development, and innovation.")

166 Schmidt, "Innovation Power."

167 See, for example, "Russia's invasion of Ukraine as seen in satellite photos," Space.com, April 4, 2022, https://www.space.com/russia-ukraine-invasion-satellite-photos; and Jane Wakefield, "Ukraine crisis: Satellite data firm asks for war images," BBC News, March 2, 2022, https://www.bbc.com/news/technology-60592657.

168 See, for example, Luke McGhee, "Here's what we know about the 40-mile-long Russian convoy outside Ukraine's capital," CNN, March 3, 2022, https://edition.cnn.com/2022/03/03/europe/russian-convoy-stalled-outside-kyiv-intl/index.html.

169 "On Google Maps, Tracking the Invasion of Ukraine," Middlebury Institute for International Studies at Monterey, March 4, 2022, https://www.middlebury.edu/institute/news/google-maps-tracking-invasion-ukraine.

170 Sandra Erwin, "STRATCOM Chief Hyten: I will not support buying big satellites that make juicy targets," Space News, November 19, 2017, https://spacenews.com/stratcom-chief-hyten-i-will-not-support-buying-big-satellites-that-make-juicy-targets/.

171 Courtney Albon, "SDA awards contracts to L3Harris, SpaceX for WFOV tracking satellites," Inside Defense, October 5, 2020, https://insidedefense.com/insider/sda-awards-contracts-l3harris-spacex-wfov-tracking-satellites; and Sandra Erwin, "Raymond: Space Force in 2022 to focus on the design of a resilient architecture," SpaceNews, January 18, 2022, https://spacenews.com/raymond-space-force-in-2022-to-focus-on-the-design-of-a-resilient-architecture/.

172 Elizabeth Howell, "How SpaceX got Starlink up and running in Ukraine: report," Space.com, March 10, 2022, https://www.space.com/how-spacex-got-starlink-running-ukraine; and "Ukraine war: Elon Musk's SpaceX firm bars Kyiv from using Starlink tech for drone control," BBC News, February 9, 2023, https://www.bbc.com/news/world-europe-64579267.

173 Kissinger, Schmidt, and Huttenlocher, *The Age of AI*.

174 Mac Thornberry, "The Pentagon must make a culture shift to embrace innovation," *Defense News*, February 2, 2023, https://www.defensenews.com/opinion/commentary/2023/02/02/the-pentagon-hasnt-made-the-culture-shift-key-to-embracing-innovation/.

175 "On Point: Q&A wit Gen. John Hyten, USAF (Ret.)," Signal, June 1, 2023, https://www.afcea.org/signal-media/defense-operations/point-qa-gen-john-hyten-usaf-ret.

176 Schmidt, "Innovation Power."

177 The newly created European Innovation Fund established in 2020 has €10 billion. "The Innovation Fund," CLERENS, https://www.euinnovationfund.eu/.

178 See, for example, Philippe Mesmer, "Japan and South Korea want NATO to toward look toward Asia," *Le Monde*, June 29, 2022, https://www.lemonde.fr/en/international/article/2022/06/29/japan-and-south-korea-

want-nato-to-look-toward-asia_5988383_4.html; Sakura Murakami and Kentaro Sugiyama, "NATO, Japan pledge to strengthen ties in face of 'historic' security threat," Reuters, January 31, 2023, https://www.reuters.com/world/nato-strengthen-partnership-with-japan-says-secretary-general-stoltenberg-2023-01-31/; and Josh Smith, "NATO's Stoltenberg in South Korea Deepen Ties in Asia," Reuters, January 29, 2023, https://www.reuters.com/world/asia-pacific/natos-stoltenberg-arrives-skorea-deepen-alliances-ties-asia-2023-01-29/.

179 See, for example, "Speech by NATO Secretary General Jens Stoltenberg at the Nuclear Policy Symposium," NATO, November 2, 2021, https://www.nato.int/cps/en/natohq/opinions_188236.htm.

180 Leonor Tomero, "With New START Setbacks Challenging Arms Control, US Must Work to Reduce Chances of Nuclear War, With or Without Russia," *Russia Matters,* Harvard Kennedy School, March 15, 2023, https://www.russiamatters.org/analysis/new-start-setbacks-challenging-arms-control-us-must-work-reduce-chances-nuclear-war-or.

181 "Joint Statement of the Leaders of the Five Nuclear-Weapon States on Preventing Nuclear War and Avoiding Arms Races," The White House, January 3, 2022, https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/03/p5-statement-on-preventing-nuclear-war-and-avoiding-arms-races.

182 If history is any guide, politics will lead the United States to lean on nuclear weapons more than is needed for both deterrence and reassurance.

183 Scott Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1995), https://press.princeton.edu/books/paperback/9780691021010/the-limits-of-safety. Indeed, this was also believed to be the case even during the arms race. "III. Evolution of Soviet Strategy" in John G. Hines, Ellis M. Mishulovich, and John F. Shull, *Soviet Intentions 1965-1985* (McLean, VA: BDM Federal LLC, 1995), https://nsarchive2.gwu.edu/nukevault/ebb285/doc02_I_ch3.pdf.

184 Franklin C. Miller, "Outdated Nuclear Treaties Heighten the Risk of Nuclear War," *Wall Street Journal,* April 21, 2022, https://www.wsj.com/articles/outdated-nuclear-treaties-new-start-treaty-russia-putin-china-xi-heighten-risk-nuclear-war-missile-test-ukraine-deterrence-11650575490.

185 Doing so, however, also increases the risks of crisis stability and could feed Chinese concerns about a disarming first strike by the United States.

186 Effective deterrence assumes rationality. Without it, much deterrence theory and work is academic.

187 "Remarks by National Security Advisor Jake Sullivan for the Arms Control Association (ACA) Annual Forum," The White House, June 2, 2023, https://www.whitehouse.gov/briefing-room/speeches-remarks/2023/06/02/remarks-by-national-security-advisor-jake-sullivan-for-the-arms-control-association-aca-annual-forum/.

188 Hans M. Kristensen and Matt Korda, "Nuclear Notebook: United States nuclear weapons, 2023," *Bulletin of the Atomic Scientists*, January 16, 2023, https://thebulletin.org/premium/2023-01/nuclear-notebook-united-states-nuclear-weapons-2023/.

189 Marcy Winograd and Medea Benjamin, "Meet the Senate nuke caucus, busting the budget and making the world less safe," Responsible Statecraft, May 26, 2021, https://responsiblestatecraft.org/2021/05/26/meet-the-senate-nuke-caucus-busting-the-budget-and-making-the-world-less-safe/.

190 Hans Kristensen et al., "Status Of World Nuclear Forces," Federation of American Scientists, March 31, 2023, https://fas.org/initiative/status-world-nuclear-forces/.

191 The United States has recently completed two such upgrades, the W-76/2 for SLBMs and the B-61/12 air-dropped weapons.

192 One of the best constructed options for this remains Bruce G. Blair, Jessica Sleight, and Emma Claire Foley, The *End of Nuclear Warfighting: Moving to a Deterrence-Only Posture* (Washington, DC: Princeton University, September 2018), https://www.globalzero.org/wp-content/uploads/2018/09/ANPR-Final.pdf.

193 Scott D. Sagan, "The Commitment Trap: Why the United States Should Not Use Nuclear Threats to Deter Biological and Chemical Weapons Attacks," *International Security* 24, no. 4 (Spring 2000): 85–115, https://www.jstor.org/stable/2539316.

COVER PHOTO
FLASHMOVIE VIA ADOBE STOCK

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

1616 Rhode Island Avenue NW
Washington, DC 20036
202 887 0200 | **www.csis.org**