

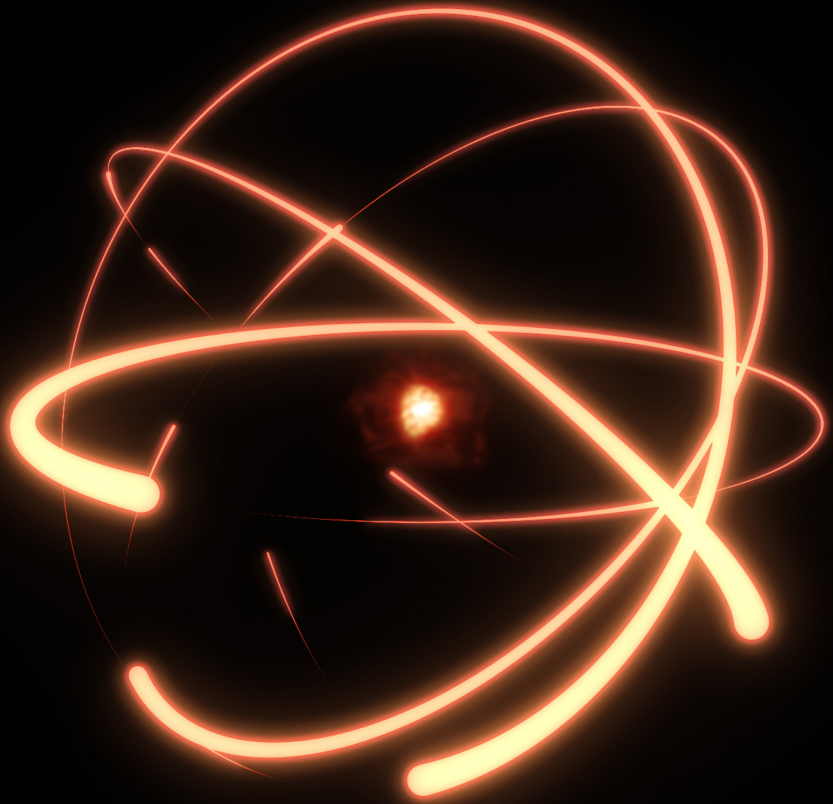
SEPTEMBER 2023

Project Atom 2023

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

AUTHORS

Heather Williams
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Lachlan MacKenzie
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A Report of the CSIS Project on Nuclear Issues

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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.

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Project Atom 2023: First Principles for Detering Two Peer Competitors

By Heather Williams, Kelsey Hartigan, and Lachlan MacKenzie

How can the United States deter two peer competitors? Russia’s illegal invasion of Ukraine has demonstrated Putin’s willingness to rely on nuclear threats to pursue regional ambitions. Conventional losses in Ukraine may also increase Russian reliance on nuclear weapons in the years to come. China’s expanding and increasingly diverse nuclear arsenal suggests that it, too, has ambitions that may rely on nuclear threats. Beijing has proven itself to be a patient but ambitious actor, described as a “pacing” threat in the 2022 U.S. National Defense Strategy, which will also present challenges for U.S. nuclear strategy and policy in the coming decade. U.S. political and military leaders need to determine the nation’s strategy to deter and, if necessary (and possible), defeat two nuclear peers simultaneously or in sequence. In doing so, leadership must also consider the implications of this strategy for nuclear force posture, nuclear modernization, extended deterrence and assurance, and arms control and disarmament strategy and commitments.

To assist in addressing these challenges for U.S. strategy, the Project on Nuclear Issues (PONI) invited a group of experts to develop competing strategies for deterring two peer competitors through 2035. This study revives a concept and approach that the Center for Strategic and International Studies (CSIS) developed a decade ago to review U.S. nuclear strategy and posture for 2025 through 2050. This project is predicated on the assumption that the vision of a world without nuclear weapons is not likely in the near future given the behavior of multiple potential adversaries. It is unconstrained by current strategy (e.g., sizing the conventional force to fight and win one major conflict, reducing the role of nuclear weapons in U.S. strategy) and current policy (e.g., the decision to cancel or not move forward with additional nuclear capabilities) unless explicitly stated otherwise in the assumptions. However, it is constrained by likely technological trends and industrial constraints on nuclear modernization. These constraints proved to be important both in assessments of modernization options and recommendations. Beyond that, authors were asked to provide a brief picture of the world in 2035 regarding nuclear and strategic issues, to identify any other underlying assumptions of their analysis. The strategies

focused on four specific themes: force posture, modernization, extended deterrence and assurance, and arms control. The strategies demonstrate surprising agreement on key issues, such as the need to assure allies and why now is not the time for nuclear reductions. But they also highlight ongoing areas of disagreement about the nature of the threats from Russia and China, requirements for U.S. nuclear forces, and the role of arms control.

After providing an overview of the competing strategies, this introductory analysis distills 10 “first principles” for a strategy to deter two peer competitors. These principles capture areas of consensus among the strategies but also engage with areas of disagreement to identify which strategy options are best suited for the current threat environment. The introduction ends with a summary of specific recommendations about the way forward for U.S. decisionmakers.

Competing Strategies for Deterring Two Peer Competitors

The PONI team provided experts with four assumptions and respective guiding questions as an analytical framework. This report contains five chapters, each of which constitutes a distinct strategy for deterring two peer competitors. A comparison of the strategies across the analytical framework is provided in Tables 1-4.

Table 1: Comparing Strategies for Deterring Two Peer Competitors—Deterrence Strategy

	Karako and Soofer	Mastro	Miller	Tomero	Wolfsthal
Force Posture/ Deterrence Strategy	<ul style="list-style-type: none"> Nuclear deterrence theory does not need to change. Focus on the operationalization of deterrence. Develop strategies to confront adversaries’ limited nuclear strike. 	<ul style="list-style-type: none"> Maintain current nuclear posture to avoid change in China’s nuclear posture. Prioritize strengthening conventional forces rather than nuclear deterrence. Avoid integration of conventional and nuclear operations and thereby reduce the risk of platform ambiguity. 	<ul style="list-style-type: none"> No changes are needed to traditional deterrence policy, but the United States must be ready to deter both peers simultaneously. Operationalize rhetorical commitment to “integrated deterrence”. 	<ul style="list-style-type: none"> The technological context of deterrence has changed, and the risk of miscalculation is increasing. The United States needs a new, more resilient, creative, and stabilizing deterrence strategy earlier in a conflict, before the threat of nuclear war. Nuclear deterrence remains central to national security, but deterring Russia and China does not require as many nuclear weapons as would be needed to meet military objectives in two large-scale nuclear wars. The United States should not prepare to fight through two large-scale nuclear wars. 	<ul style="list-style-type: none"> Invest in conventional and nonnuclear, nonconventional capabilities (e.g., space, cyber, artificial intelligence, and non-kinetic); intelligence to understand Russian and Chinese objectives; and nonnuclear, nonmilitary responses to the two adversaries. Reducing the role of nuclear weapons carries inherent risks, but relying on the fallible nature of nuclear deterrence presents ever-present risks.

Table 2: Comparing Strategies for Deterring Two Peer Competitors—Modernization

	Karako and Soofer	Mastro	Miller	Tomero	Wolfsthal
Modernization	<ul style="list-style-type: none"> • Matching adversaries' combined numbers is not necessary. • Modestly increase deployed U.S. nuclear arsenal and warhead uploading. • Deploy SLCM-N on attack submarines in two theaters. • Invest in a mobile ICBM force and additional NC3 channels, strip alert for bombers early in crisis, and modify procedures for quicker SSBN deployment. 	<ul style="list-style-type: none"> • No quantitative increase in the U.S. arsenal is needed to deter Russia and China. • Focus on modernizing conventional forces instead. 	<ul style="list-style-type: none"> • Prioritize and expand modernization but do not aim for numerical parity with Russia and China combined. • Increase the level of U.S. strategic warheads and loads on all legs of the triad. • Restore submarines and bombers converted under New START. • Deploy SLCM-N. • Rejuvenate the defense-industrial base. • Increase NNSA funding and move it out from under the DOE umbrella 	<ul style="list-style-type: none"> • No quantitative increase in the U.S. arsenal is needed to deter Russia and China. • Innovation is key—the United States should modernize beyond legacy platforms. • More low-yield options are unlikely to further deter adversaries. • Prioritize survivable platforms, including mobile ICBMs, SSBNs, and NC3. 	<ul style="list-style-type: none"> • Continue qualitative investment in a flexible and responsive nuclear infrastructure, but there must be a clear military objective for the development of new capabilities. • Consider investing in fewer but MIRVed ICBMs, mobile ICBMs, and Columbia-class submarines instead of replacement of fixed ICBMs only.

Table 3: Comparing Strategies for Deterring Two Peer Competitors—Extended Deterrence

	Karako and Soofer	Mastro	Miller	Tomero	Wolfsthal
Extended Deterrence and Assurance	<ul style="list-style-type: none"> • Expand Allies' share in conventional and nuclear defense. • Consider forward deployment of SLCM-N, GLCM/ GLBMs in several regions. • Exercise and prepare for contingency operations. • Field long-range hypersonic weapons. 	<ul style="list-style-type: none"> • Deployment of tactical weapons will not effectively address assurance issues. • Revisit the benefits and costs of independent nuclear weapons programs in Asia. • Invest in allied consultations and joint defense planning. 	<ul style="list-style-type: none"> • Continue development of SLCM-N and deploy on submarines in theaters as means of assurance. • Include Japan and South Korea in AUKUS for loose alliance with interoperability and burden sharing. • Field long-range conventional hypersonic weapons. 	<ul style="list-style-type: none"> • Credible assurance can best be achieved through senior-level communication, exercises, and consultations, not new capabilities or new deployments of capabilities that are not suited to temporary forward deployment. • Prioritize interoperability among allies and take a close look at over-classification. 	<ul style="list-style-type: none"> • Assure allies beyond the nuclear and military components (e.g., through economic, political, technical, cultural, and people-to-people spheres). • Encourage allies to take on a greater share of conventional defense capabilities. • Avoid normalization of reliance on nuclear weapons, which could drive independent allied nuclear programs.

Table 4: Comparing Strategies for Deterring Two Peer Competitors—Arms Control

	Karako and Soofer	Mastro	Miller	Tomero	Wolfsthal
Arms Control	<ul style="list-style-type: none"> The follow-on to New START should raise the warhead ceiling, allowing for expansion of U.S. nuclear forces but avoiding open-ended nuclear competition. Progress toward disarmament is doubtful. Prioritize arms control without treaties or risk reduction measures. 	<ul style="list-style-type: none"> Arms control with China should not focus on quantitative restrictions but on asymmetric approaches. Engage on artificial intelligence in military force structures (formulating regulations and safety mechanisms) and space. 	<ul style="list-style-type: none"> Long-term quantitative agreements that include all nuclear weapons in great power arms control might be feasible. Disarmament is unrealistic. Russia, China, and the United States should ban the test of fractional orbital ballistic systems immediately. Arms control must allow the force size needed to deter Russia and China. 	<ul style="list-style-type: none"> Expand the scope of risk reduction to include cross-domain arms control and new technologies for verification 	<ul style="list-style-type: none"> Develop and prioritize arms control policies that stigmatize nuclear acquisition, clearly determine U.S. strategic goals, and include verification commitments. Show a willingness to agree to constraints on U.S. and allied nuclear capabilities in exchange for adversary reductions. Be prepared to adjust modernization plans.

It is important to acknowledge at the outset that some of the Project Atom experts questioned the premise of the exercise. Multiple strategies make a case for maintaining the status quo despite the two peer competitor problem and caution that changes to the nuclear posture or modernization plans could have an escalatory effect. One expert disagrees that China is a “competitor” and focuses the analysis on why China should not be treated similarly to Russia. These definitional issues underpin areas where the strategies align and where there are areas of disagreement.

Important areas of agreement include:

- China and Russia’s nuclear arsenals pose significant challenges for the United States and its allies.
- The United States should not pursue unilateral nuclear reductions at this time.
- The United States does not need to match Russia and China’s combined arsenal numbers.
- The United States needs more flexibility and agility in its arsenal, whether that be with more advanced conventional capabilities, additional new nuclear delivery platforms, or the ability to adjust modernization plans.
- U.S. credibility with allies is fragile, and Washington can take steps, such as more consultations and joint planning, to improve this.
- Prospects for arms control in the near term are bleak, but verifiable arms control that constrains adversary capabilities, reduces the risk of war, and avoids unnecessary nuclear arms competition remains in the U.S. national interest. More informal risk reduction options are a better way forward for the time being.

While the strategies are largely aligned on these overarching principles, they differ on details of how to manage complexity and uncertainty in the evolving geopolitical and technological landscapes. Areas of disagreement include:

- Beijing's intentions, and how the United States can influence China's strategic calculus.
- Whether or not the United States should expand and diversify its nuclear arsenal, such as with nuclear-capable sea-launched cruise missiles (SLCM-Ns) or with a warhead buildup when New START expires.
- The escalatory risks of nuclear weapons, particularly in the face of advanced conventional weapons and nonnuclear strategic capabilities.
- Reliance on nuclear weapons for extended deterrence and as a tool to strengthen credibility with allies.
- How the United States might incentivize China to join arms control agreements.

The remainder of this section offers a more in-depth analysis of how the competing strategies address questions of force posture, modernization, extended deterrence, and arms control. The authors were given a series of assumptions and guiding questions, which are included here for context.

Framing Assumptions

DETERRENCE STRATEGY AND NUCLEAR POSTURE REQUIREMENTS

Assumption #1: The United States will pursue a multi-domain deterrence strategy to deal with complexity and uncertainty in the current and future threat environment, and nuclear weapons will remain one element of a broader approach. This raises the following questions with regards to deterring two peer competitors:

- What should the United States' core deterrence objectives be in 2035?
- Does deterring two peer competitors require overhauling current U.S. thinking about deterrence? How, and in what way?
- How might nuclear force structure requirements change in the future, and what factors should the United States consider when setting those requirements going forward?
- How should the United States approach integrating nuclear and conventional capabilities, as well as cyber and space operations, to deter two peer competitors while at the same time managing escalation dynamics?

Force posture refers to day-to-day and readiness status and the deployment location of various elements of the force; force structure refers to the kinds of nuclear forces to field.

In any future strategy, establishing who and what specifically the United States and its allies intend to deter is critical. The strategies agree that deterring nuclear use by U.S. adversaries should continue to be an enduring objective, as well as that Russia and China pose the most significant deterrence challenges, with North Korea posing a lesser threat. But these strategies do not simply approach the issue with a blank slate. The challenge of deterring two nuclear peers may be less about overhauling U.S. nuclear strategy and current thinking about deterrence and more about what capabilities and approaches are required to achieve the United States' broader, long-standing objectives. Each of the strategies make clear that deterring nuclear use must be part and parcel of a broader deterrence strategy that seeks to deter aggression below the nuclear threshold—a goal consistent with the current U.S. strategy of deterring both aggression and strategic attacks on the United States and its allies and partners.

Much of the analysis and many of the recommendations in this report deal primarily with two separate but related deterrence challenges. The first is deterring limited nuclear use, a particularly pronounced challenge considering the prospects for a regional conflict to escalate beyond the conventional level and the fact that limited nuclear use is perhaps the most likely pathway to large-scale escalation. The strategies differ on the question of what will deter Russia or China from escalating to limited nuclear use in a regional conflict and what options a president might want available if deterrence fails. Miller as well as Karako and Soofer weigh different options for augmenting existing low-yield capabilities and conclude that the United States should move forward with the SLCM-N to increase the availability of credible response options. Tomero, Mastro, and Wolfsthal reject this notion. Wolfsthal argues there is no need to change U.S. force posture and what he identifies as the “five current modes of nuclear employment.” Tomero argues instead that deterring limited nuclear war “requires credible signaling that an adversary will not gain any military or political advantage from using nuclear weapons,” and that “adding ever more low-yield nuclear weapons cannot substitute for credible threats clearly communicated.” Alternatives for signaling threat credibility are relatively under-explored in some of the papers, however. Supporters of SLCM-N argue that signaling to adversaries that they cannot gain an advantage may be difficult or impossible with non-nuclear capabilities, whereas appropriate nuclear capabilities have a unique ability to signal resolve to adversaries and allies alike.

The second deterrence challenge is deterring collusion and opportunistic aggression, or the notion that Russia and China (or a regional actor) could conduct simultaneous or sequential attacks that would force the United States to deter and possibly wage large-scale conflicts in two theaters against two nuclear peers. The strategies make slightly different assumptions about what “opportunistic aggression” or simultaneous conflicts might entail. Soofer and Karako argue that the need to deter a simultaneous conflict with Russia and China places “an increasing burden on the role of nuclear weapons to deter conventional aggression.” Mastro, on the other hand, argues that “nuclear weapons do not deter admittedly problematic conventional activities,” and that “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.” And Miller stresses the importance of simultaneous deterrence because of the risk of collusion.

MODERNIZATION

Assumption #2: The United States will continue to strategically compete with adversaries by modernizing U.S. nuclear forces and developing emerging technologies. This raises the following questions in regard to two peer competitors:

- Are current modernization plans and the nuclear triad fit for the purpose of deterring two peer competitors?
- If deterring two peer adversaries requires adjustments to current modernization plans, what changes might be required, what limitations exist, and how could the United States manage the risks of a future arms race?
- Will the development of artificial intelligence (AI) and other advanced technologies by the United States and its adversaries confer greater benefits to U.S. deterrence efforts?

The United States is currently in the midst of a massive effort to modernize every element of its nuclear forces. The strategies differ on what changes can and should be made to the current program of record, but they largely agree on the importance of building a more responsive nuclear infrastructure and prioritizing investments in nuclear command and control upgrades. Mastro takes a wide look at the trade-offs between nuclear force modernization and conventional force posture investments and concludes that “in instances

in which nuclear modernization may come at the expense of conventional force development, conventional force development should have priority.” Miller, on the other hand, argues that the “current U.S. nuclear modernization plan itself is necessary but not sufficient.” He explains, “simple logic and arithmetic suggest that the force level enshrined in the New START treaty in the 2010s and designed for a world far different from today’s is insufficient for 2023—let alone for later in this decade and on into the 2030s.” Given the long lead times and industrial capacity constraints that currently exist, Miller as well as Soofer and Karako make the case for uploading additional warheads on existing platforms, or at least ensuring that U.S. forces can do so if and when necessary.

Tomero, on the other hand, does not support an increase to the current U.S. stockpile but leaves open the possibility of changes to the current modernization program, arguing that the United States should “prioritize survivable platforms and architectures to provide stability and resilience” and “think more creatively about basing modes and concepts of operation.” Wolfsthal agrees with Tomero that the current program of record is “more than adequate” but highlights the importance of investment in nuclear command and control and early warning capabilities. How many and what kinds of nuclear weapons the United States needs to support its strategy is a matter of significant debate in this series, and one that comes down to, in part, how the strategies consider the trade-offs between nuclear modernization and investments in conventional capabilities and forces. These debates fundamentally revolve around the question of the role of nuclear weapons in different strategies and what forces will be required to enable those strategies.

Extended Deterrence and Assurance

Assumption #3: The United States will continue to provide extended deterrence and assurance guarantees to allies in Europe and Asia. This raises the following questions:

- How can the United States assure a diverse group of allies against two peer competitors and other regional threats, and how might allies contribute more to their own security?
- What synchronization challenges with allies should the United States expect to face in the future? How can the United States best prepare to overcome these challenges?
- How might divergent threat perceptions among allies affect the future of U.S. extended deterrence and perceptions of U.S. credibility?

All strategies recognized the need for the United States to strengthen its credibility with allies. The majority of strategies recognized that nuclear risks will be highest in regional conflicts, likely involving U.S. allies. Extended deterrence and assurance, therefore, will be essential for a U.S. strategy in deterring two peer competitors, but it will also be challenging. As such, the United States needs to take steps to strengthen credibility with allies. All strategies spoke to this point, with varying recommendations for how to do so. Tomero focuses on more non-nuclear interoperability, Karako and Soofer recommend more consultations, and Mastro also suggests more consultations along with joint planning. Miller offers the most ambitious strategy for assurance, identifies why new capabilities, such as SLCM-N, serve important extended deterrence and assurance functions, and recommends integrating Japan and South Korea into AUKUS.

The strategies differ, however, in the escalatory risks of these assurance strategies, with Mastro particularly cautioning against increased reliance on nuclear weapons because of how this could be perceived in Beijing. Namely, Beijing could see an increased U.S. reliance on nuclear weapons, a nuclear buildup, or any change in U.S. nuclear posture for the purposes of extended deterrence and assurance as a sign of the United States’

desire to gain supremacy over China in a future conflict, prompting an arms race in the region. Similarly, Wolfsthal warns that “being willing to resort to early and first use may have negative implications for crisis stability and arms racing.” Tomero and others consider nonnuclear options for assurance that may strike a delicate balance of strengthening extended deterrence and credibility with allies while avoiding an action-reaction cycle with China or Russia. But shifting away from nuclear weapons in signaling credibility and commitment could be risky in the security environment of the next decade.

The strategies briefly touch on an important question as to whether or not U.S. allies should pursue independent nuclear programs. Mastro urges restraint on the part of the United States in supporting allies’ proliferation interests because of the potential risk that “this could undermine the global nonproliferation regime and increase the likelihood of nuclear use due to accident.” Conversely, Karako and Soofer suggest that over the long term it may become necessary to revisit the question of nuclear nonproliferation, and they consider the potential risks and benefits for Japan, for example, pursuing an independent nuclear program. To be clear, Karako and Soofer do not go so far as recommending this as a policy option, but they point to it as an important consideration as the United States develops a strategy for deterring two peer competitors.

ARMS CONTROL

Assumption #4: The United States will continue to be obligated to comply with the Non-Proliferation Treaty (NPT) and will continue to pursue a dual-track approach of arms control and deterrence. It will complete implementation of New START in 2026, but whether or not there is a follow-on arms control effort is undecided and up to the discretion of the authors. This raises the following questions:

- How can the United States continue to pursue progress toward arms control and disarmament while deterring two peer competitors?
- What are the risks to U.S. interests if arms control efforts stall? How can the United States mitigate those risks?
- Can the United States consider making meaningful progress toward Article VI commitments when Russia does not seem to be committed to making reciprocal moves and China has shown no willingness to limit its nuclear growth and modernization efforts?

One area of consistency across the strategies is support for arms control efforts, albeit in different forms. Mastro, for example, outlines options for engaging China on arms control for emerging technologies, which aligns with Tomero’s focus on the potentially escalatory nature of many of these capabilities. Miller recommends that the three competitors immediately pursue a test ban on fractional orbital bombardment systems (FOBS). Wolfsthal outlines priorities for modernization that will lay the groundwork for future arms control, such as increasing predictability and decisionmaking time, but stresses that the United States should not “pursue modernization to enhance arms control prospects.”

While all strategies recognize the intersection of arms control and deterrence, there is disagreement in how they should operate in relationship to one another. Miller and Karako and Soofer emphasize that deterrence, to include force posture and modernization plans, should be the priority and precede any decisions about arms control. Conversely, Wolfsthal recommends that the United States “seek concepts that make nuclear weapon use less likely and less acceptable.” While these would seemingly be obvious priorities, they may be at odds with a deterrence strategy that will rely on moving deterrence “to the left,” deterring opportunistic aggression, and strengthening U.S. credibility among allies.

By raising the question about the long-term desirability of nonproliferation, as discussed above, Karako and Soofer also challenge the assumption that implementing the disarmament envisioned by the NPT is in the United States' long-term interests. For Wolfsthal in particular, remaining committed to reducing reliance on nuclear weapons and disarmament over the long term should be a priority. Undermining the NPT either by supporting proliferation or failing to commit to continued implementation of Article VI could have wider repercussions for the nuclear order.

First Principles for Deterring Two Peer Competitors

Plans and requirements for U.S. force posture, modernization, extended deterrence, and arms control will all fundamentally depend on the overarching U.S. deterrence strategy. The competing strategies—including their areas of agreement and disagreement—help to tease out certain fundamentals that should guide such a deterrence strategy. Based on these arguments, this report identifies 10 “first principles” to inform strategy and policymaking across the U.S. government. These principles are not agreed to by all the authors but are the analysis of the PONI research team based on reviewing the competing strategies.

- **Principle 1:** The fundamentals of how deterrence works have not changed. U.S. decisionmakers should be specific about who and what they are attempting to deter. Deterrence continues to rely on capability, credibility, and communication. It requires convincing an adversary's leadership that they cannot achieve their objectives through aggression or escalation and that they will incur costs that far exceed any gains they hope to achieve. This requires, in part, identifying and holding at risk what an adversary values most, being able to deliver on that threat, and being able to impose unacceptable costs. The impending two-peer threat environment is unprecedented and requires tailoring deterrence to two different competitors, separately and in combination. Specifically, it requires a strategy that identifies who the United States is trying to deter, what it is trying to deter, and under what conditions. Extended deterrence fundamentals are also the same as they have always been, but they require tailoring to multiple allies with diverse requirements and concerns.
- **Principle 2:** The United States does not need to match Russia and China's combined arsenal size, but it does need to evaluate U.S. force requirements in order to compete with Russia and China to strengthen strategic stability, maintain a credible deterrent, reassure allies, and achieve U.S. objectives if deterrence fails. This competition will likely require some nuclear buildup, particularly for more flexible systems; however, it can also entail nonnuclear capabilities and finding new applications of emerging technologies that enhance deterrence. Any nuclear buildup should take into account the potential risks of misperception and escalation by Beijing and Moscow.
- **Principle 3:** The United States should not make any unilateral reductions to its nuclear arsenal or cut back on the current program of record. Doing so would limit options for a U.S. president in future crisis scenarios. It could undermine the fundamentals of deterrence—the ability to deliver upon a threat in a way that is credible. Additionally, any unilateral reductions at this time would further weaken the United States' credibility with allies and the credibility of threats to adversaries. This includes any unilateral reductions in the North Atlantic Treaty Organization's (NATO) nuclear mission or by other NATO nuclear actors.
- **Principle 4:** Flexibility should be a priority in both force posture and force structure. The president should have more options, nuclear and non-nuclear, in the event of a catastrophic threat to the United States or its allies. More flexibility will also strengthen credibility. In terms of force posture, this might

require more ambiguity in the United States' declaratory policy and removing mention of plans to work toward a "sole purpose" doctrine. And in terms of force structure, this means reconsidering supplemental nuclear delivery platforms that are survivable, rapidly available in theater, and credible, such as SLCM-N, along with more advanced conventional options that can deliver deep precision strikes and hit hard and deeply buried targets. Overall, the nuclear enterprise will need to become more agile to respond to these changes.

- **Principle 5:** Emerging technologies are an essential domain of competition. Many of these technologies risk giving an adversary an asymmetric strategic advantage, undermining strategic stability, and increasing nuclear risks. At a minimum, the United States should commit—unilaterally or multilaterally, such as through the P5 process—to keeping a human in the loop in nuclear decisionmaking. The United States should compete in emerging technologies, to include AI and hypersonics, both to avoid strategic surprise and to provide the president with more response options, including non-kinetic ones. Any strategy for deterring peer competitors should capitalize on the potential advantages of emerging technologies but also balance these developments with efforts to avoid their potentially destabilizing effects, such as by including them in a future strategic stability dialogue with Beijing.
- **Principle 6:** U.S. strategy should give more attention to preventing and managing escalation at the regional level. Deterrence strategy should focus on deterring regional coercion and aggression, to include opportunistic aggression, re-establishing deterrence in the event of escalation, and signaling resolve to defend allies. At the same time, the United States will need to ensure a capability to deter and defend against attacks on the homeland and ensure the survivability of the U.S. arsenal. This will require a more diverse deterrence tool kit, to include nonnuclear strategic capabilities.
- **Principle 7:** Allies are a force-multiplier. Strengthening U.S. credibility with allies should be a priority. Assuring allies may require even more effort than deterring adversaries. Potential tools for doing so include additional capabilities, such as SLCM-N and rapid deployment of the nuclear-capable F-35, as the best way to strengthen credibility with allies. Washington can also improve nonnuclear interoperability with allies and address long-standing classification and export control challenges that impede its ability to share technologies and information with its closest allies. Other means of doing so include sustained investment in the nuclear enterprise, to include the National Nuclear Security Administration and the National Laboratories, more frequent and in-depth planning, consultations and exercises, and additional high-level standing dialogues.
- **Principle 8:** Arms control and risk reduction initiatives can provide tools for escalation management and work hand-in-hand with deterrence. As deterrence becomes more integrated, so must arms control. Some specific arms control and risk reduction proposals to be considered include a multilateral FOBS test ban, joint P5 statements on a "human in the loop," investment in new verification tools, cross-generational arms control knowledge transfer, and remaining open to dialogue with Beijing. Any future arms control with Russia will likely depend on the outcome of the war in Ukraine and on how China's rapid nuclear force expansion affects U.S. nuclear force requirements.
- **Principle 9:** Now is not the time to reduce reliance on nuclear weapons in U.S. national security strategy. Reducing reliance on nuclear weapons and making more progress toward "general and complete disarmament," as outlined in NPT Article VI, should remain a goal for long-term policy both for nonproliferation purposes and to uphold the rules-based international order. On the one hand, continuing to express this objective demonstrates U.S. commitment to the NPT and to upholding the nuclear order. Additionally, these signals are important for some allies with strong disarmament legacies

and movements. On the other hand, in the current climate, such statements risk setting unrealistic expectations and undermining U.S. deterrence and assurance priorities. The United States can find other avenues for demonstrating commitment to Article VI, such as leading in the P5 process, combatting Russian and Chinese disinformation that threatens to undermine the NPT, and offering new arms control and risk reduction initiatives that will help avoid arms racing and nuclear use, the most fundamental shared objective among deterrence supporters and skeptics alike.

- **Principle 10:** The United States should be a leader in the global nuclear order. This should include at least three main components. First and foremost, the United States should strengthen existing institutions, particularly the NPT. More states with nuclear weapons mean more nuclear risks. The nonproliferation regime still serves U.S. interests. It should discourage allies' proliferation, which may require additional signals and capabilities as a demonstration of the United States' commitment to their security. Second, the United States should prioritize more informal approaches to arms control and risk reduction measures. And finally, the United States can lay important groundwork now by investing in people, not just capabilities. The complexity of the security environment requires developing different kinds of analysts and leaders who can think holistically about deterrence and managing competition across both the nuclear and conventional realms. Developing a clear strategy, tailoring deterrence to specific adversaries, assuring allies, and making difficult decisions about how to plan, invest in, and employ U.S. forces are fundamentally human tasks that require investing in people—not just things. This means focusing on education, cognitive understanding and decisionmaking, and communication skills.

Conclusion

The overarching finding of these strategies is that the United States needs increased flexibility. A flexible strategy will require focusing on investing in the nuclear enterprise so that it can become more agile and can respond to leadership demand signals and further changes in the threat environment. The United States should also immediately focus on strengthening its credibility with allies through consultations. It can lead on arms control and risk reduction by exploring multilateral opportunities, though these are likely to be informal and allow for flexibility in adapting to the new security environment. Over the medium and long term, that might require developing new conventional capabilities or new delivery platforms and building up the arsenal, which would require making decisions now about force structure and acquisition. Many of the necessary capabilities for deterring two peer competitors will have long lead times, and part of a flexible deterrence strategy requires flexibility in the nuclear enterprise that does not currently exist.

There are challenges to these first principles and recommendations. One potential risk is U.S. force posture and modernization decisions being misinterpreted by adversaries as aggression rather than a response to their actions. Another is further inhibiting prospects for arms control. Over the long term, many of these questions will depend on the evolution of the security environment; therefore, a flexible strategy is the best option for the strategic landscape of the next 10 years.

Project Atom: Defining U.S. Nuclear Strategy, 2030–2050

By Rob Soofer and Tom Karako

Introduction

In August 2021, the commander of U.S. Strategic Command, Admiral Charles Richard, issued a public challenge for fresh thinking about deterrence theory and nuclear strategy:

At STRATCOM, we are re-writing operational deterrence theory and asking the hard questions. This will take a national and academic undertaking. Only when we gain a fundamental understanding of how deterrence theory is applicable in today’s strategic environment, can we inform strategy, create a mutual understanding of that strategy and threat, and then execute plans in support of our national defense.¹

Consistent with Admiral Richard’s charge, Project Atom’s study objective is to determine the “best U.S. strategy for deterring two peer competitors” and to assist the United States in making “crucial decisions about its future nuclear strategy and forces.” While the broader question of deterring Russian and Chinese conventional aggression and adventurism must be foremost in these considerations, the focus of this paper is on the nuclear concepts, policies, strategies, forces, and posture necessary to deter and prevent nuclear use by Russia and China—the two nuclear peer (2NP) competitors. How the government addresses the 2NP, or three-party, problem also has implications for and will be influenced by budget and arms control considerations.

For each of the research questions, this paper first outlines principles of theory and strategy, then applies these to the new Russian and Chinese strategic contexts.

Understanding the Problem

It has been the long-standing national security policy of the United States to deter aggression by Russia, China, and other states posing a threat to U.S. vital interests. As noted in the 2022 U.S. *National Defense Strategy*, the United States' top-level priority is to deter threats against and strategic attacks against the United States and its allies and partners. With respect to nuclear threats, the strategy and forces necessary to deter Chinese aggression and nuclear escalation have largely been considered a lesser included case: if the United States maintains the strength necessary to deter Russia, it can also deter a much smaller Chinese nuclear force. The expansion of Chinese power in all its dimensions (e.g., economic, conventional, nuclear, cyber, and space) means that China must be considered a true rival in its own right and no longer a lesser included nuclear case.²

Complicating the strategic problem is the possibility that the United States may find itself in a crisis or conflict with both Russia and China at the same time—including the scenario of opportunistic aggression. This may be the result of intentional collusion or alliance between Russia and China, although it is difficult to be predictive on this score. As noted in the 2022 Nuclear Posture Review: “In a potential conflict with a competitor, the United States would need to be able to deter opportunistic aggression by another competitor. We will rely in part on nuclear weapons to help mitigate this risk, recognizing that a near simultaneous conflict with two nuclear armed states would constitute an extreme circumstance.”³

The phrase “extreme circumstance” is noteworthy because it refers back to the long-standing U.S. policy that the nation would only employ nuclear weapons in extreme circumstances to defend its vital interests. This phrasing suggests that in a circumstance where U.S. and allied conventional forces may not be adequate to address a simultaneous conflict with Russia and China, nuclear weapons may come into play. If this were the case in any particular scenario, then U.S. nuclear forces and strategy would play an important role.

The recognition that China has now amassed significant conventional capabilities makes the challenge more complex. In the context of renewed long-term strategic competition, the 2018 National Defense Strategy's approach to conventional forces and a blunting strategy (i.e., forces in place to resist the initial aggression) is important to preclude nonnuclear strategic defeat. Strategic deterrence in the 2NP problem is more than just nuclear deterrence. The problem also includes the need to deter major aggression short of nuclear employment and to do so under two major nuclear shadows.

The 2022 Nuclear Posture Review (NPR) notes that the United States must “be able to deter both large-scale and limited nuclear attacks from a range of adversaries” and that “the ability to deter limited nuclear use is the key to deterring non-nuclear aggression.”⁴ U.S. conventional forces alone are not currently adequate to address a simultaneous conflict with Russia and China (and possibly on the Korean peninsula), thus placing an increasing burden on the role of nuclear weapons to deter conventional aggression.⁵ In the face of the significant Chinese conventional force buildup, this relationship seems unlikely to change in the foreseeable future. Increased conventional forces and air and missile defenses, however, will be critical to contribute to raising the threshold at which nuclear employment may be required to blunt non-nuclear aggression.

In summary, potential Russian and Chinese cooperation poses a challenge to U.S. interests in peacetime, crisis, and war. In peacetime, the United States and its allies must be prepared to respond in a timely manner to potential future developments in the strategic postures of China and Russia, whether qualitative or quantitative. The United States must persuade Beijing and Moscow through words and deeds that nuclear competition is a failing proposition that will provide no strategic advantage. In a time of crisis, the United States and its allies would have to strengthen deterrence simultaneously in two theaters. This is not a new

problem for U.S. military strategy, but the 2NP challenge puts a rising premium on the capacity of U.S. allies and partners to contribute to alliance deterrence postures in new ways.⁶

In war against one adversary, the United States would have to contemplate the possibility of war with the other, whether simultaneously or in close succession. This implies the need to be capable of strategic nuclear attacks against both Russia and China even after either or both engage in a preemptive nuclear attack on U.S. forces. The United States and its allies would also need to anticipate the consequences of (perhaps limited) nuclear strikes in one theater on the deterrence and escalation dynamics in the other theater. Would the third party conclude that the United States still would be willing to run additional risk after suffering nuclear strikes, or would they conclude instead that the United States would retreat in hope of avoiding further escalation?

Deterrence Theory and Strategy

While the nature of deterrence does not change, its character must adjust for new actors, circumstances, and weapons. To deter, one must create in the mind of the adversary the fear not to attack—to convince them that costs will outweigh the benefits and that the use of nuclear weapons is the worst possible choice. The credibility of nuclear deterrence depends on a combination of resolve and capabilities.

While China's emergence as a serious nuclear competitor requires that the United States tailor its deterrence strategies, it is not clear that the central problems of nuclear deterrence have changed. The dilemmas of extended deterrence—that is, threatening to use nuclear weapons on behalf of distant allies despite one's own vulnerability to nuclear retaliation—that existed during the Cold War in the U.S.-Russia context will be relived, albeit in a three-way contest. This may have implications for force structure but should not affect the theoretical underpinning and complexity of deterrence.

As during the Cold War, the United States must convince both Chinese and Russian leaders that the costs and risks of nuclear use will outweigh any benefits—that any nuclear use will make them worse off. This requires a belief in the credible use of nuclear weapons by the United States in response to the adversary's use of nuclear weapons.

Does nuclear deterrence become more complicated in a three-way game? Three is not inherently more unstable than two, although that appears to be the conventional wisdom in the academic literature. One recent article compares the 2NP problem to the “three-body” problem in astrophysics, where it is impossible to predict the motion of three celestial bodies.⁷ Others fear the increasing prospect for misunderstanding or inadvertent nuclear use resulting from a greater number of nuclear great powers.

It is also possible that a tripolar nuclear context would induce greater caution and stability. For instance, if Russian and U.S. leaders were to contemplate nuclear use against each other during a conventional conflict, they must also consider that China may be the unharmed beneficiary from that nuclear exchange—the last country standing, so to speak.⁸

What if Russia and China collude to attack the United States simultaneously? Or what if one country takes the opportunity to challenge U.S. interests in one region while the United States is occupied with the other adversary? Does this weaken the United States' ability to deter both at the same time? It is a challenging set of questions, to be sure, but in theory nuclear deterrence can hold if the United States successfully creates the necessary fear of nuclear use against both Russia and China under all circumstances. The concern is whether the United States may be so weakened by the first nuclear attack (or not be able to communicate with

its nuclear forces) that this lessens the fear in the mind of the second adversary. It also begs the question of whether a combined nuclear attack would be able to effectively disarm the United States. The solution to these concerns is one of strategy and forces, not deterrence theory.

This dilemma is related to, but not to be confused with, the traditional “two-war” problem that U.S. presidents have faced since the end of the Cold War. In 1993, President Bill Clinton adopted a readiness standard to fight a large offensive ground war in the Persian Gulf and another on the Korean peninsula, while George W. Bush laid out the requirement to simultaneously fight a war in two critical areas and be expected to win decisively in one of those conflicts, such as Iraq and Afghanistan. Nuclear deterrence is not a substitute for strong conventional forces, which are needed to address the two-war problem.

On balance, it is not necessary to reconsider the nuclear deterrence theories developed during the Cold War to confront this environment. Nevertheless, the United States must ensure that it can operationalize deterrence through its nuclear strategy and forces. U.S. nuclear strategy must be able to achieve the political and military objectives established by the president for those forces. More fundamentally, U.S. nuclear employment must credibly be able to impose costs on the adversary that are out of all proportion to the assumed benefits of its action. If it can do so, this contributes to deterrence against both adversaries; if it is unable to do so, the United States must either alter the strategy or provide additional forces to implement the strategy against two nuclear peers.

The Logic of U.S. Nuclear Strategy

Nuclear strategy is the employment or threatened employment of nuclear weapons to achieve policy-related or wartime objectives. These objectives could include defense of the United States, an ally, or other vital interests, or terminating a nuclear exchange as quickly as possible. Political and military objectives could change during a conflict, and it may be necessary for nuclear strategy to adapt accordingly.

Nuclear strategy is related to nuclear deterrence because if the nuclear strategy is credible, it is more likely to persuade an adversary that the risks and costs of aggression outweigh any supposed benefits. If the nuclear strategy or its employment is not credible (either because the United States lacks capabilities or is threatened with unacceptable retaliation), this diminishes the deterrent effect. As former secretary of defense Robert S. McNamara said, “One cannot fashion a credible deterrent out of an incredible act.”⁹

U.S. nuclear strategy rests on the idea that the country’s ability to meet all nuclear provocations—large and small—can encourage adversaries to rethink their use of nuclear weapons. It is not a strategy of preemption or disarming first strikes. It does not require superiority or escalation dominance—only that the adversary likewise does not enjoy these advantages.

It is a strategy of resolve and restraint. U.S. employment of nuclear weapons could seek to restore deterrence (avert further escalation) after an adversary’s initial limited use of nuclear weapons in a theater of operations; to cease nuclear escalation at the lowest possible level of violence; or to convince the adversary that whatever led them to believe that using nuclear weapons would provide them an advantage was a mistake.

U.S. nuclear strategy deters large-scale nuclear attacks against the homeland by maintaining the capability to inflict costs unacceptable to an opponent. As such, U.S. nuclear forces would target an adversary’s senior leadership and political structures, nuclear and theater conventional forces, and war-supporting industry.¹⁰

Maintaining the ability to retaliate against large-scale attacks against the United States reinforces the country's ability to restore nuclear deterrence at lower levels because the adversary has nothing to gain from further nuclear escalation to the strategic nuclear level.

In terms of ends, ways, and means:

- The ends of U.S. nuclear strategy are to help deter both large-scale conventional aggression and nuclear use and, should deterrence fail, restore deterrence with the least amount of nuclear destruction and on the best possible terms for the United States and its allies.
- The means include a range of nuclear delivery systems with various yields to address a variety of regional and strategic scenarios. U.S. nuclear strategy calls for forces capable of delivering large-scale nuclear responses as well as limited and graduated response options.
- The ways include nuclear strikes that limit further attacks on civilians by targeting adversary nuclear and conventional forces, strikes that hold at risk what the United States assesses that the adversary values, and, through selective restraint, incentivizes them from engaging in further attacks.

It is difficult to know whether further exchanges could be limited once nuclear use occurs. But it is prudent to develop strategies for confronting limited nuclear use because the United States' adversaries field capabilities to do so. There is always the risk that the adversary will ignore or misinterpret a U.S. signal of restraint and respond with large-scale attacks, though this would be tantamount to national suicide because the United States maintains the option for a large-scale nuclear response (an assured destruction capability).

This inherent uncertainty about what happens after limited nuclear use is one reason it is important to remember that nuclear forces do not exist in isolation and would not exist in isolation even after their employment. The dial does not simply switch from "conventional war" to "nuclear war." Conventional forces, including long-range strike, continue to be relevant as both deterrents themselves and for damage limitation purposes. The war could well continue, even if it does not include further nuclear employment. U.S. Global Strike Command has control of significant nuclear forces, but they also control significant conventional strike, and there is little reason to suppose that conventional forces would cease even after limited nuclear use. The goal of stemming further escalation could even be enhanced by the simultaneous signals of restraint and resolve that would be communicated by returning to conventional strikes.

In addition to conventional strike, another aspect of conventional forces relevant to nuclear posture is air and missile defenses, which may contribute to the survivability of both nuclear and nonnuclear strategic assets. As the prospects increase for nonnuclear strategic attack, including through air and missile forces in particular, those assets that cannot be moved or hidden may require active defense. Such an approach underlies the Biden administration's approach, led by U.S. Indo-Pacific Command, to the 360-degree air and missile defense for Guam. Given its salience for power projection and broad U.S. deterrence and defense goals in the region, including for bomber forces, a significant attack that negated U.S. ability to project power from Guam would be a strategic event, irrespective of whether or not nuclear weapons were used. By raising the threshold for a successful attack on strategic power-projection abilities, air and missile defenses can contribute to crisis stability and to escalation control.

The risk that a limited nuclear escalation could, however, rise to large-scale nuclear attack adds to the deterrent effect at the outset. As noted in the 2020 Report to Congress on *Nuclear Employment Guidance*:

A tailored and graduated nuclear response does not mean an adversary can confidently predict only a symmetrical response or that the adversary can define escalation thresholds by the matter of its initial nuclear use. What an adversary can confidently anticipate is the certainty of an effective U.S. response to nuclear attack, at any level, and in any context, in ways that will impose greater costs than any expected or hoped-for gain.¹¹

U.S. nuclear strategy seeks to deter adversary nuclear use by convincing them that there is no scenario for nuclear use to which the United States cannot respond in an unacceptably costly manner to the adversary. Should nuclear deterrence fail, the U.S. response is intended to demonstrate both resolve and restraint in the hope of convincing the adversary to abandon further nuclear use.

But will this strategy hold up against two nuclear peers at the same time?

STRESS TESTING THE STRATEGY

How does the logic of U.S. nuclear strategy stand up in a 2NP environment? Here is where the analysis becomes speculative and where assumptions can make a big difference. For the sake of discussion, the authors postulate the following to be the case by 2035:

- Russia and China deploy a triad of strategic nuclear delivery systems at roughly New START force levels (1,550 warheads and approximately 700 delivery systems).
- Russia and China enjoy significant regional nuclear superiority. Russia retains over 2,000 land, air, and sea-based “nonstrategic” nuclear weapons. China possesses over 900 nuclear-capable theater-range missiles.
- All nuclear forces will be on alert during a crisis; all adversaries will maintain the capability to launch under attack; and mobile land and sea forces will be dispersed, ensuring each country maintains an assured second-strike capability.
- The United States will continue to be vulnerable to the second-strike capabilities of Russia and China and unable to limit damage to politically acceptable levels through precision non-nuclear strikes, a disarming preemptive nuclear first-strike, or missile defense. The same is true for Russia and China in relation to potential strikes from the United States. All three powers, however, have significant air and missile defenses that could impede the penetration ability of some delivery systems.
- Russian and Chinese doctrines, like that of the United States, allow for limited nuclear use and escalation management. In other words, escalation to massive strategic nuclear strikes is not an inescapable conclusion but remains a possibility for which the United States must plan.¹²

U.S. nuclear strategy for deterring limited or regional nuclear use is predicated on restoring deterrence (i.e., preventing further nuclear escalation) at the lowest level possible through flexible, limited, and graduated response options and by withholding strikes on what the adversary values most, to encourage restraint. The growth of Russian and Chinese nonstrategic nuclear forces suggest that the deterrent effect of this strategy may be diminished during a regional conflict.¹³ Russia and China have many more regional nuclear options, while the options available to the United States are not necessarily prompt, may lack survivability, and may be exposed to Russian and Chinese air defenses.

This rationale supported the 2018 NPR’s recommendation for the W76-2 low-yield submarine-launched ballistic missile (SLBM) warhead and the nuclear-capable sea-launched cruise missile (SLCM-N) to strengthen nuclear strategy and bolster nuclear deterrence at the regional level.¹⁴ The principal advantage of the SLCM-N over

other theater nuclear options is that it provides a timely response from a platform already located in the theater rather than from fighter aircraft or long-range bombers generated from the U.S. homeland. Based at sea on attack submarines, the SLCM-N is inherently more survivable than land-based options and avoids potential political problems associated with asking host nations to base nuclear forces on their territory. Placing SLCM-N on attack submarines also complicates the anti-submarine warfare problem for adversaries, enhancing the overall survivability of the sea-based leg of the nuclear triad.

Assuming the United States continues to deploy the W76-2 and by 2030 deploys SCLM-N to bolster regional deterrence options, then the current U.S. nuclear strategy, forces, and force posture could be sufficient to enable U.S. nuclear strategy against both China and Russia at the theater level. Additionally, the United States must maintain sufficient survivable strategic nuclear forces to ensure that China or Russia do not contemplate disarming the United States at any point during the crisis. The assured retaliatory force must be large enough, at the end of whatever escalation ladder has been played out, to target what the leadership of both adversaries holds dear—presumably political and military control structures, strategic forces, and war recovery targets.

What if U.S. strategy fails to induce restraint and one of the two adversaries escalates from limited to large-scale nuclear attacks against the U.S. homeland? At this point, the United States would need sufficient and enduring nuclear forces to keep fighting or deterring limited use in one theater while retaliating against a large-scale attack from the other adversary.

The requirements here are considerable. In addition to maintaining nuclear weapons of ample diversity, survivability, and adaptability to deter or respond to limited nuclear use by both adversaries, the United States must be capable of inflicting intolerable damage against both adversaries to deter up to two simultaneous, large-scale attacks against the U.S. homeland. It is a difficult (though not totally unlikely) scenario to imagine because U.S. nuclear forces will be on alert: even combined adversary attacks against U.S. nuclear forces should not be able to prevent the United States' ability to respond, assuming it ensures that its forces and nuclear command, control, and communications (NC3) are survivable and can operate over a protracted period.

Modernization and Force Posture

To deter limited or large-scale nuclear escalation by an adversary, the United States requires a credible strategy for the employment of nuclear weapons in all circumstances against any combination of aggressors. This calls for a strategic nuclear force capable of limited and graduated nuclear options, backed by a secure capability for inflicting intolerable damage after absorbing a large-scale nuclear attack by, potentially, Russia and China. This leads to three force posture recommendations.

First, the United States must never enter a position where adversaries could think that it could conduct a disarming first strike against U.S. nuclear forces. Therefore, the survivability and durability of U.S. nuclear forces remain the first priority. As China and Russia increase the size of their strategic nuclear forces, the United States can respond either by increasing the size of its strategic nuclear forces or by making its existing nuclear force more survivable and less targetable (or a combination of the two). While a full military-technical-political analysis of these measures is beyond the scope of this paper, some ways to improve that survivability may include:

- Making a portion of the ICBM force road-mobile (garrison-based);

- Adding more redundant NC3 channels and pathways;
- Enhancing bomber survivability earlier in a crisis (e.g., place on strip alert);
- Re-examining the relationship between warning, alert, stability, and dispersal levels (e.g., consider raising to higher alert levels, earlier in a crisis);
- Modifying procedures for SSBN deployment and operations to get more boats out to sea sooner; and
- Defending strategic forces and other critical infrastructure with limited air and missile defense with the objective of increasing the uncertainty of a successful disarming first strike against U.S. strategic nuclear forces.

Second, the United States must be capable of convincing adversaries that their limited nuclear usage in a regional confrontation would not succeed and would induce unacceptable risk and cost. The United States requires additional nuclear forces at the regional level to address Russia and China's significant advantages in the numbers and types of nuclear weapons they have available in the region.

Matching adversary numbers is not necessary. Rather, the deployment of some additional theater nuclear forces would signal to Russia and China that the United States is prepared to meet any potential limited or theater nuclear escalation without having to rely on strategic nuclear forces, which may not appear credible to the adversary or timely in certain circumstances. While the recommended course of action is to deploy a modest number of SLCM-Ns on attack submarines, other options to explore could include the following (though none of these options match the advantages in survivability and presence granted by SLCM-N):¹⁵

- Regionally deploy nuclear ground-launched, Intermediate-Range Nuclear Forces (INF) Treaty-range ballistic and cruise missiles;
- Forward deploy dual-capable fighter aircraft to the Indo-Pacific, similar to U.S. deployment in Europe;
- Demonstrate the ability to forward deploy B-52s with cruise missiles when needed; and
- Establish new nuclear burden-sharing, planning, and training arrangements with allies.

Third, with respect to strategic nuclear forces, it has been a long-standing policy requirement of U.S. strategic nuclear forces to target adversary nuclear forces, to the extent practicable, to limit the damage of retaliatory strikes. If this remains a critical targeting objective, then the United States may require additional nuclear forces to meet the growth in Chinese and Russian nuclear forces, though not on a weapon-for-weapon basis. Despite recent improvements in the accuracy and hard-target-kill capability of nuclear forces, the United States may find it difficult to limit adversary retaliation regardless of how many additional offensive forces it deploys because Russian and Chinese nuclear forces have become more survivable through mobility. Russian and Chinese early warning systems may also permit launch under attack. Still, there are other targets of value to the adversary, and that number is likely to rise in the case of deterring Russia and China simultaneously. How the United States responds to the growth of Chinese and Russian nuclear forces will depend on the timing and nature of that expansion and will require a formal analysis conducted by U.S. Strategic Command in concert with political authorities.

Prudence dictates that the United States should anticipate and hedge against a Chinese race for nuclear parity or superiority by ensuring the capability to upload reserve warheads onto the SLBM and perhaps the ICBM force and additional cruise missiles and bombs to the strategic bomber force upon expiration of the New START treaty in February 2026. The extent to which the United States deploys additional warheads above current levels should be based in part on the number and trajectory of the Chinese and Russian nuclear

threats, as well as prospects for further arms control measures. At a minimum, preparation must begin in the near term to ensure nuclear warheads in the inactive stockpile are brought to an active status—not a trivial process.

Hedging is necessary to avoid or mitigate risks to the nuclear force that could develop over time, such as an unforeseen technical difficulty with a particular category of warhead or delivery system or advances in adversary offensive and defensive capabilities. Hedging can also dissuade adversaries from seeking to gain advantage through “breakout” (i.e., quickly deploying additional nuclear forces) by maintaining a U.S. capability to produce and deploy additional weapons if needed. Though the 2022 NPR does not include “hedging” as a formal goal (as was the case in the 2018 NPR), it does place emphasis on “a resilient and adaptive nuclear security enterprise” to “be able to respond in a timely way to threat developments and technology opportunities, maintain effectiveness over time, and at all times ensure that Presidential guidance can be achieved.”¹⁶ Central to the administration’s approach is a “production-based resilience program” to efficiently produce weapons required in the near term and beyond. This will be important to rebuild the “hedge” should it become necessary to upload warheads from the inactive reserve.

Finally, as the United States anticipates the need to upload reserve warheads onto the existing deployed force, it must redouble efforts to build a responsive nuclear infrastructure capable of reconstituting the nuclear warhead hedge for the future. Likewise, as noted in the 2022 NPR, the United States will have to reevaluate the Department of Energy and National Nuclear Security Administration programs and requirements as the security environment evolves. Time is of the essence. According to Deborah Rosenblum, assistant secretary of defense for nuclear, chemical, and biological weapons, “We find ourselves at an urgent inflection point. . . . we have a third imperative task before us: to look over the next 20 years to identify the capability that we believe we will need based on the threat picture and start expending the necessary resources now to pace those threats.”¹⁷

Extended Deterrence and Assurance

The emerging strategic environment will have important implications for extended deterrence and, by extension, assurance of allies. Russia and China have increasingly threatened the United States and its allies with hybrid, conventional, and nuclear forces. Accordingly, allied dependence on U.S. extended deterrence will remain a key feature of the international system between 2030 and 2050. As Kurt Campbell, the president’s coordinator for Indo-Pacific affairs, recently pointed out, allies are nervous—there can be no doubt about this.¹⁸ Whether certain allies will act upon this loss of confidence to develop their own nuclear capabilities or to accommodate Russia or China is unknowable, but it is best not to find out. Instead, the United States should continue to provide credible security assurances backed up by effective nuclear capabilities.

The United States faced the problem of assuring allies for most of the Cold War. For U.S. extended deterrence and assurance to remain credible, the United States must continue to provide political assurances while also convincing its allies and adversaries that it is willing and able to employ nuclear weapons on behalf of its allies even in the most stressing circumstances. Effective deterrence is the foundation for effective assurance; as the requirements for extended deterrence increase, so do the requirements for assurance.

Nuclear tripolarity exacerbates this problem. Allies may worry that the United States will be reluctant to fight an adversary if doing so could lead to nuclear escalation against two nuclear powers. The United States will

have to reassure allies that it has sufficient conventional and nuclear forces to deal with two nuclear peers at the same time, and that it is willing to run risks on their behalf. It is not clear, however, if the United States has enough bombers and dual-capable fighter aircraft to meet both conventional and nuclear missions in two major theaters of war. Finally, allies could worry that they will not be the primary theater of concern if the United States is forced to choose between two.

Allies recognize that the United States is vulnerable to nuclear retaliation and pay close attention to the United States' response to China's (and North Korea's) nuclear modernization. If the United States does little to address the new situation, allies will question U.S. commitment to their security. Adaptations to nuclear deterrence—to extended deterrence posture—will be necessary. Changes are needed to both the “hardware” (i.e., capabilities and force posture) and “software” (i.e., planning, consultations, and exercises) of U.S. nuclear strategy. The United States must ask allies to do more and provide enhanced consultative mechanisms—the time is ripe for more extensive nuclear burden sharing and consultation, such as the newly constituted Nuclear Consultative Group between the United States and South Korea. If allies lose confidence in the U.S. nuclear umbrella, this failure could cause them to accommodate regional adversaries, reduce alliance cohesion, or seek nuclear arsenals of their own.

Adjusting Extended Deterrence Postures

The current extended deterrence posture and assurance frameworks are products of a post-Cold War goal to reduce the role of nuclear weapons in foreign policy. For example, the United States has withdrawn its nuclear weapons from the Indo-Pacific region and all but the B61 nuclear gravity bomb from Europe. The United States does not have a multilateral consultative framework in the Indo-Pacific as it does in Europe through the North Atlantic Treaty Organization (NATO).

The increased threat from China, Russia, and North Korea provides an opportunity to reconsider these architectures, especially in the Indo-Pacific. Today, Japan, South Korea, and Australia may be more willing to enter a more formal consultative arrangement with the United States similar to the NATO Nuclear Planning Group. A new arrangement could offer opportunities for defense ministers to weigh in on nuclear posture, planning, tabletop exercises, and other matters. It is also worth exploring how current diplomatic structures could be expanded to encompass issues and activities pertaining to force posture, basing, nuclear sharing, training, and other matters related to nuclear deterrence.

The United States must ask more of allies in terms of conventional forces as well as participation in nuclear deterrence activities because a strong conventional defense could obviate the need for or increase reliance upon nuclear weapons to deter aggression.

One could explore these possible nuclear-related options to bolster extended deterrence. Some measures are already underway, and some are politically fraught. This analysis provides a range of options for illustrative purposes which could be pursued with allies.

NATO:

- Continue the planned nuclear force modernization and survivability measures;
- Modernize dual-capable aircraft (e.g., realistic training, planning, and exercises);
- Improve the survivability of NATO's nuclear forces through dispersal and other active and passive

measures;

- Expand nuclear burden sharing by seeking other allies to fly nuclear-armed aircraft or base nuclear weapons in their countries, although the U.S. president will maintain control over these weapons; and
- Deploy ground- and sea-based nuclear forces, with SLCM-N being the preference.

U.S. Indo-Pacific Command:

- Complete the robust air and missile defense capabilities for Guam in the 2020s, including with robust fire control integration, consistent with U.S. Indo-Pacific Command's prioritization;
- Build on existing bilateral consultative forums, including the new Nuclear Consultative Group between the United States and South Korea;
- Consider multilateral consultative frameworks similar to the NATO Nuclear Planning Group;
- Consider more tangible U.S. nuclear force presence, such as demonstrating the ability to deploy U.S. nuclear-capable fighter aircraft to the region; and
- Prioritize the conventional long-range strike capability and capacity of key allies such as Japan and Australia.

Forward Deployment:

- Deploy F-35s with gravity bombs or standoff weapons in one or more regions;
- Regionally deploy nuclear-capable bombers (or place on rotational deployment);
- Deploy SLCM-N on U.S. attack submarines;
- Acquire the capability to regionally deploy ground-launched cruise or ballistic missiles, and diplomatically explore contingency basing operations for the same;
- Exercise and prepare contingency operations for mobile air and missile defenses to protect both U.S. and allied interests;
- Acquire the capability and significant capacity for rapidly deployable ground-based, long-range precision fires; and
- Field long-range hypersonic weapons based in multiple domains.

To be sure, some of these recommended courses of action will face political, operational, and funding challenges, while others could be perceived as escalatory by adversaries. This includes allied basing requirements, survivability of the systems and command and control, and congressional considerations. For reasons stated elsewhere, the authors believe the SLCM-N provides the best combination of survivability, responsiveness, and flexibility with little or no political costs associated with host-nation basing.¹⁹

Arms Control

Arms control could be a useful tool in managing and bounding the 2NP problem, but the United States needs willing partners. Expiration of the New START in February 2026 will drive the search for a follow-on framework sooner rather than later. Russia's suspension of participation in inspections and reporting requirements under the treaty is not encouraging. Nevertheless, the United States should not determine its negotiating position until it first settles on a nuclear deterrence strategy and the forces necessary to implement employment guidance, and discussions take place between the administration and Congress on this

approach.²⁰ Regardless of whether the United States can secure limitations on nuclear forces, there are a range of other risk reduction measures that should be explored with Russia and China (i.e., so-called “arms control without treaties”).

China will be difficult to bring to the table, but any future arms control treaty or framework with Russia to replace New START must consider Chinese nuclear forces even if China is not a party to the formal agreement. A follow-on agreement or framework does not require the United States to match the combined nuclear strength of both Russia and China—only that it maintains sufficient survivable and flexible forces to deter both regional and strategic nuclear threats under all likely circumstances. This reality will require a modest increase in the size of the deployed U.S. nuclear arsenal, but one that the authors believe Russia can accommodate, rather than an unlimited nuclear arms race that it cannot afford to run.

The New START limited Russia and the United States to 1,550 warheads on 700 strategic delivery vehicles (i.e., ICBMs, SLBMs, and heavy bombers). This limit may be too low to accommodate the additional regional nuclear capabilities (if they are captured in a new agreement) and potential strategic warhead uploads necessary to address the 2NP problem after 2030. The New START also does not limit Russian nonstrategic nuclear warheads, estimated at about 2,000 for land-, air-, and sea-based regional dual-capable forces.

The arms control objective, therefore, is to negotiate a new overall warhead ceiling that provides room for a modest expansion of U.S. nuclear forces to address the 2NP problem while reducing or capping the growth of Russian nonstrategic and novel nuclear weapons. One Project Atom contributor suggests a ceiling of about 3,500 total warheads with sub-limits for strategic forces covered under New START. That number could be smaller. Arms control advocates will no doubt blanch at raising the New START warhead ceiling and question whether it serves U.S. national security to return to larger mutual strategic nuclear force levels with Russia, but for those who believe the United States needs a larger strategic arsenal to deal with China, this option is preferable to an open-ended nuclear competition. Others may question whether increasing U.S. and Russian strategic forces will cause China to increase its nuclear forces beyond the levels currently projected.

While current Russian noncompliance with the New START suggests that any treaty will be a hard sell in the current environment, Vladimir Putin did indicate toward the end of the Trump administration that he might accept a one-year freeze on all Russian nuclear weapons. If one assumes that the war in Ukraine is creating budgetary pressures for Russia, then treaty limits on U.S. strategic nuclear forces will likely remain in Russia's interest after New START expires. The United States will require negotiating leverage to include all warheads in a new agreement, which it can obtain in the near term through the threat of additional warhead uploads onto U.S. strategic nuclear forces and in the longer term by threatening to continue production of new ICBMs, nuclear ballistic missile submarines, air-launched cruise missiles, and heavy bombers after the 2030s.

While the prospects for negotiated arms control treaties seem bleak now, this does not mean the United States should eschew other forms of nuclear risk reduction—what some might call arms control without treaties. Covered more extensively by other contributors to Project Atom, one could imagine creating and continuing dialogues with Russia and China on what sometimes is referred to as “strategic stability” or “crisis stability” issues. This might include dialogue on crisis communications, nuclear strategy and doctrine, and transparency of nuclear and non-nuclear strategic forces, for both long-range strike and missile defenses, as well as unilateral and parallel reciprocal measures to provide transparency and constraints on nuclear forces.

Given the strategic environment and doubts about either Russian or Chinese reductions or even transparency, it is doubtful that there can or should be meaningful progress toward the NPT commitments for disarmament

in the near term. Article VI's obligations for pursuing negotiations toward "a treaty on general and complete disarmament" is unlikely to be a productive topic of discussion. Recognizing that fact candidly is important. Indeed, under the current circumstances, whispers are growing louder in Japan and South Korea for potential nuclear capabilities of their own, or for a nuclear sharing arrangement with the United States. Former prime minister Abe Shinzo suggested such an arrangement publicly in February 2022, in the days after Russia's further invasion of Ukraine.²¹

This suggestion may strike some as discordant with the long-standing policies and postures toward nuclear disarmament. It is. The charge of Project Atom is to consider a far-reaching timeline, for which the strictures and solutions of the mid-twentieth century may require adjustment. Inasmuch as renewed long-term strategic competition is the central challenge of the current era, it may in time even become necessary to revisit the question of nuclear nonproliferation more broadly. A nuclear-armed Japan, for instance, could be preferable to failing to deter a major war with China, and it could become necessary if Japan's defense buildup does not progress sufficiently fast. In the near term, however, the conventional munitions and forces buildups for Japan, Australia, and the United States in the Indo-Pacific should continue to be pursued with prioritization. If the United States wishes to avoid a nuclear arms race, it may need to be more serious about a conventional arms race.

Conclusion

Project Atom asked the several competitive teams to frame an approach to U.S. nuclear strategy that wrestles with the need to simultaneously deter two nuclear great powers while considering the broader implications for U.S. nuclear modernization, extended deterrence, and arms control.

This paper contends that no major changes are warranted to the fundamentals of deterrence theory or to current U.S. nuclear strategy and employment guidance. The complexities and difficulties of sustaining nuclear deterrence will not be appreciably intensified due to China's nuclear expansion. Moreover, the long-standing U.S. nuclear strategy of flexible and tailored response remains preferable to the alternatives of minimum deterrence or nuclear primacy. Nevertheless, while theory and employment guidance remain valid in the emerging strategic environment, some modest changes to the ways and means of U.S. nuclear strategy may be in order. The United States today lacks certain nuclear forces necessary to ensure deterrence against two nuclear great powers, potentially at the same time.

First and foremost, force posture changes are necessary to improve the survivability and endurance of U.S. strategic nuclear forces and increase the flexibility and readiness of forward-based nuclear forces. Next, a modest number of additional regional nuclear forces, including the SLCM-N, would reinforce deterrence at the regional level—where war is likely to start—and compensate for Russian and Chinese advantage in nonstrategic nuclear forces. These changes should be supplemented by increased and survivable conventionally armed munitions, improved regional air and missile defenses, and improved conventional-nuclear integration. Additional hedging options, such as warhead uploading, are necessary to enable a timely increase in the size of U.S. strategic forces if needed to respond to the growth of Chinese strategic nuclear forces after 2030.

Domestic political and production limitations will pose challenges for the United States to grow its nuclear forces in the near to mid term. The ongoing debate between the administration and Congress over the development and fielding of a SLCM-N suggests it will be difficult to reach political consensus on the augmentation of U.S. nuclear forces.²² In the near term, it is more feasible to improve the survivability

and endurance of existing nuclear forces, although not without cost. Increased capability and capacity of conventional strike forces and air and missile defenses will also play a critical role in increasing stability, supporting escalation control, and improving survivability of strategic assets. It is, however, possible to envision political compromises that combine support for a modest increase in U.S. nuclear forces with support for a follow-on arms control framework that limits nuclear growth after New START and addresses the expansion of Chinese nuclear forces. Deterrence in a 2NP environment will be difficult but not impossible; it is less a matter of strategic imagination than of commitment and sustained effort.

China's Nuclear Enterprise

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

By Oriana Skylar Mastro²³

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.

U.S. Nuclear Policy in a Two Peer Nuclear Adversary World

By Franklin C. Miller

Prologue: How Did We Get to Where We Are?

Beginning in the late 1940s, nuclear forces first dominated, and then were a dominating factor in, U.S. defense policy for over 40 years. As the Cold War ended, and the threat of al Qaeda and global terrorism emerged, the U.S. defense establishment turned its focus away from nuclear deterrence and the forces which it supported. Systems which were first built in the 1960s and were then modernized or replaced in the 1980s should have been similarly modernized or replaced beginning in the Clinton and George W. Bush administrations, but they were not. As a result, as the Obama administration ended, the outgoing secretary of defense, the late Ashton Carter, observed:

. . . the Defense Department cannot further defer recapitalizing Cold War-era systems if we are to maintain a safe, secure, and effective nuclear force that will continue to deter potential adversaries that are making improvements in their air defenses and their own nuclear weapons systems. The choice is not between replacing these platforms or keeping them, but rather between replacing them and losing them altogether. The latter outcome would, unfortunately, result in lost confidence in our ability to deter. The United States cannot afford this in today's security environment or in any reasonably foreseeable future security environment.¹¹²

Concurrent with this neglect of force posture, the U.S. government failed to view nuclear deterrence policy as a major area of interest, and even the idea that a nuclear deterrent relationship with Russia, or even the small but growing nuclear forces of China or North Korea, required high-level attention attracted little support. Russia's invasion of Crimea, North Korea's continued expansion of its nuclear arsenal, and the

emergence of the aggressive Xi Jinping as China's next leader caused the Obama administration in mid-stream to rediscover the importance of nuclear deterrence. Successive U.S. administrations have continued on that path, but as they have done so, the global scene has become more unsettled.

An Unsettling Echo of the Past

By any reasonable measure, the world has become a more dangerous place over the past 10 years. Russia, China, and North Korea are increasingly dangerous. All three nations' autocratic leaders seek to intimidate their democratically oriented neighbors, and all three harbor ambitions of imperial aggression.

A student of history would observe that the 2020s are eerily reminiscent of the 1930s. Adolf Hitler doubted the will of the Western democracies and went to war against them despite the advice of his military. (His claim that wherever the German language was spoken must be incorporated into the Nazi state resembles Putin's claims about Russophone territory.) In Tokyo, Premier Togo Shigenori and his ruling clique were similarly convinced, in highly racist terms, that the United States and United Kingdom were weak, failing nations that lacked the will to defend themselves. Both Berlin and Tokyo were convinced that the internal domestic political divisions in the United States and United Kingdom would prevent any unity to rally against aggression. All of this rings true today, with the exception that Putin, Xi, and Kim Jong-un also possess nuclear weapons their twentieth-century forebears lacked. As a result, the United States' credibility and its commitment to defend allies are once again being called into question by aggressive authoritarian regimes—but today these countries' possession of nuclear weapons allows them to add a dangerous new element of intimidation and coercion.

Putin, Xi, and Kim believe deeply in the political power of nuclear weapons. This is evidenced by their significant investment in the modernization and growth of their nuclear forces, for both long-range and theater/tactical purposes. It is made evident by their use of nuclear blackmail, in Xi's case a more subtle exercise of that blackmail than Putin or Kim's efforts; but in all three cases, such blackmail had an effect on regional politics and stability. None of them accepts traditional Western ideas of "strategic stability" (despite decades of well-meaning Westerners seeking to "educate" them). This can be seen in their continued embrace of intercontinental ballistic missiles (ICBMs) equipped with multiple independent reentry vehicles (MIRVs), their continued rejection of transparency, and their continued willingness to push the envelope with respect to state-sanctioned dangerous military activities and incidents at sea (despite Moscow and Beijing's membership in accords which prohibit such reckless behavior). All of this is compounded by investments in massive conventional forces and offensive space and cyber capabilities.

Accordingly, as the United States faces the present and the future, its overriding priority must be to protect U.S. and allied security and territorial integrity without having to fight a war. This means the United States must deter major aggression and blackmail by an enemy (or enemies) using conventional forces, nuclear forces, cyber forces, or space capabilities. That is the country's deterrent task for today and for tomorrow.

The Essence of Deterrence Policy

The Biden administration, in its October 2022 National Security Strategy, recognized the gravity of the threats facing the United States and its allies:

Russia poses an immediate threat to the free and open international system, recklessly flouting the basic laws of the international order today, as its brutal war of aggression against Ukraine has shown. The PRC, by contrast, is the only competitor with both the intent to reshape the international order and, increasingly, the economic, diplomatic, military, and technological power to advance that objective.¹¹³

These twin political challenges are made more fraught by the fact that, due to the buildup of its nuclear arsenal, China has now essentially joined Russia as a “nuclear peer” of the United States. (While some will point out that China’s strategic arsenal is today considerably smaller than that of the United States, two facts—that it (1) now fields an operational strategic nuclear triad and a large number of theater and tactical-range nuclear weapons, and (2) that it is continuing to deploy more nuclear weapons—certainly qualifies it to be a “nuclear peer” of the United States.) Never before in the nuclear age has the United States faced two potential nuclear peer adversaries, each of which can act alone or, potentially, in concert with the other. This is the reality of the “new nuclear world.”

To preserve peace and prevent war, the United States must return to the fundamental constructs of deterrence policy. The basic and traditional deterrence policy construct holds for this new world: the leadership of potential aggressors must see the United States as capable of inflicting various amounts of unacceptable pain should they decide to attack the United States or its allies at any level. The 1983 Scowcroft Commission produced the best statement of this principle:

Deterrence is not and cannot be bluff. In order for deterrence to be effective we must not merely have weapons, we must be perceived to be able, and prepared, if necessary, to use them effectively against the key elements of [an enemy’s] power. Deterrence is not an abstract notion amenable to simple quantification. Still less is it a mirror of what would deter ourselves. Deterrence is the set of beliefs in the minds of the [enemy] leaders, given their own values and attitudes, about our capabilities and our will. It requires us to determine, as best we can, what would deter them from considering aggression, even in a crisis—not to determine what would deter us.¹¹⁴

To continue to deter effectively today and for the foreseeable future, the United States must credibly continue to hold at risk what potential enemy leaders value most: themselves, the security forces which keep them in power, their military forces, and their war-supporting industry.

As noted above, what has changed in this new world is the emergence of China as a second nuclear peer to the United States. Recognizing this, the United States needs, for the first time in the nuclear age, to be able to deter Russia and China simultaneously (not just sequentially). Dictators can act quickly and with great secrecy. The United States must be ever mindful of the possibility that, like Hitler and Stalin, Xi and Putin could unveil at any point, most dangerously in a crisis, a treaty of military and political alliance.

From Policy to Forces: Why a Triad?

The United States’ continued investment in a strategic nuclear force based on a triad of land-based ICBMs, submarine-launched ballistic missiles (SLBMs), and manned bombers equipped with either stand-off cruise missiles or gravity bombs remains, despite skepticism in some quarters, the optimal manner in which to deploy a nuclear deterrent. The triad started life, admittedly, as the offspring of the inter-service rivalries of the 1950s. During the 1960s, however, strategists recognized that the combination of three different basing modes, each with unique strengths and different but offsetting vulnerabilities, separate attack azimuths,

and complementary alert postures, presented potential enemy offenses and defenses with insurmountable obstacles. All of this remains true today. As a result, the three-legged combination continues to provide maximum deterrent stability because an aggressor cannot pre-emptively destroy the triad or prevent the retaliation it could impose. Interestingly, while some U.S. critics deride the triad concept, it is worth noting that it has been copied by Russia, China, Israel, and India.

Why a Modernized Triad?

As former secretary of defense Ash Carter's comment indicates, the viability of the U.S. deterrent is slowly deteriorating. The Minuteman III ICBMs were first deployed in the 1970s. Their electronics, guidance systems, and motors have all been modernized several times over the last 50 years, but those options are no longer available to prolong their lifespan. The existing force will have to be retired within the next 10 years. The new Sentinel ICBM will replace the 450 Minuteman missiles on a one-for-one basis, thereby ensuring the continuation of a sovereign-based force which will possess high responsiveness and accuracy as well as rapid, secure communications. Ohio-class submarines, the first of which began its service in 1982, have served longer than any previous class of U.S. nuclear-powered submarine. A submarine's safety is affected principally by the pressure its hull has endured throughout its lifetime and whether the equipment associated with the nuclear plant has become brittle. Based on these indicators, the Ohio-class submarines must be retired within the next 10 to 15 years. A "minimum of 12" Columbia-class ballistic missile submarines (SSBNs) will begin replacing the 14 Ohio-class boats starting in the late 2020s.¹¹⁵ The bomber force consists of (modernized) 1960s-era B-52s and a small number of 1990s-era B-2s. The B-52s have been incapable for decades of penetrating heavily defended airspace and have been equipped with cruise missiles as a result. Those cruise missiles, however, entered into service in the early 1980s and had a designed service life of 10 years. They will not pose a credible threat by the end of this decade. A replacement cruise missile, the Long Range Stand Off (LRSO) cruise missile is scheduled to enter service in 2029-2030, thereby ensuring the B-52's continued relevance. Only 19 stealth penetrating B-2 bombers exist, and these are scheduled to be replaced by 120 new penetrating B-21 bombers.

Ever since the current strategic modernization program was first approved during the Obama administration, twin questions have been raised as to its affordability and its priority among other defense needs. The program is affordable. The Department of Defense (DOD)'s 2018 Nuclear Posture Review (basing its figures on a smaller DOD budget than exists today) stated:

While estimates of the cost to sustain and replace U.S. nuclear capabilities vary . . . even the highest of these projections place the highpoint of the future cost at approximately 6.4 percent of the current DoD budget. Maintaining and operating our current aging nuclear forces now requires between two and three percent of the DoD budget and the replacement program to rebuild the triad for decades of service will peak for several years at only approximately four percent beyond the existing sustainment level of spending. This 6.4 percent of the current DoD budget required for the long-term program represents less than one percent of today's overall federal budget.¹¹⁶

Prioritizing nuclear modernization is not a real issue when one considers that nuclear deterrence fundamentally underwrites U.S. strategic interests and military missions around the world. To be sure, the United States is currently in urgent need of, among other things: deployed conventional prompt strike systems; rebuilt war reserve munitions stockpiles across the board for ground, air, and naval forces; more robust space offensive and defensive systems; advanced cyber warfare capabilities; and dramatically more tanker aircraft than today. All contribute to the United States' ability to deter adventurism, aggression, and

war. But their deterrent effect in a world defined by two nuclear peer states depends first and foremost on an unquestioned strategic nuclear deterrent.

How Much Is Enough?

Deterring China and Russia simultaneously leads to a need for an increased level of U.S. strategic warheads: simple logic and arithmetic suggest that the force level enshrined in New START during the 2010s and designed for a world far different from today's is insufficient for 2023—let alone for later in this decade and on into the 2030s. Therefore, it follows that the current U.S. nuclear modernization plan itself is necessary but not sufficient. While the triad concept remains sound, the modernization plan was conceived to deal with a far less dangerous world. Within the next several years, either as a result of an ignominious early end to New START or its expiration in 2026, the United States will have to begin to deploy a larger deterrent force. For the near term, and probably through at least the mid-2030s, the United States will need to take warheads out of the “reserve hedge” and place them in the field. This will require increasing the loadout on the Minuteman 3 ICBM from one to two or three warheads (and in the future continuing this on the new Sentinel ground-based strategic deterrent ICBM system), increasing the loadout on the Trident II/D-5 SLBM up to eight (as well as restoring to operational status the four missile tubes on each Ohio-class submarine which were “neutered” under New START), and increasing to the maximum number possible the AGM-86B air-launched cruise missiles (ALCM-Bs) and B61-12 bombs assigned to the B-52s and B-2s. (The United States should also take steps to return to nuclear-capable status those B-52s “neutered” under New START, although there will not be sufficient LRSOs to arm them until the 2030s.) None of this can be achieved overnight. The United States can, however, begin to reach the levels required to deter Moscow and Beijing simultaneously by preparing now to upload and doing so after New START constraints have been removed. This will sustain deterrence through the 2030s as replacement systems come online. Assuming no diminution in the threat, and therefore the continued need to maintain those force levels in the 2030s and beyond, the United States can sustain deterrence by extending the modernization programs for the Columbia SSBN, B-21, and LRSO—building more than 12 Columbia SSBNs and more than 120 B-21s and ensuring that the Air Force has sufficient LRSOs to hang one on every mounting point on the B-52s and B-21s (which is not the current Air Force plan).

Russia, China, and North Korea all have significant short-range and mid-range nuclear forces, and Putin and Kim often indulge in threats to use these systems. (As noted, Xi's threats are more subtle but nevertheless real). The United States needs to have a clear range of options below the strategic level to deter the use of these weapons in wartime. The United States' sub-strategic options outside of the North Atlantic Treaty Organization's (NATO) Europe (where the country has NATO-deployed dual-combat aircraft) are confined to the W76-2 SLBM warhead. Having only one type of response option is never a sound deterrent approach; the United States needs to augment the W76-2 particularly for non-NATO contingencies. As a result, the country must proceed to develop and deploy a new sea-launched, nuclear-tipped cruise missile to bolster theater deterrence.

Underwriting the weapons systems is an aging nuclear command and control structure which also must be upgraded and modernized.

How Much Is “Too Much”?

The measure of whether the United States' strategic nuclear force is sufficient should be whether it allows the country to hold at risk the valued assets of the Russian, Chinese, and North Korean leaderships and

to maintain an adequate reserve force. The idea that the United States must maintain “parity” or rough equivalence with Russian or Chinese nuclear force levels should not be a factor in force sizing. As long as the United States is confident in its ability to cover its targets—and it can make that convincingly clear to potential adversaries—it should not enter into a competition to achieve numerical parity. It should be of no consequence if Moscow or Beijing (or both) seek to build and deploy forces which exceed U.S. levels; their ability “to make the rubble bounce” is not strategically significant and should not be perceived as such. The only area where parity or equality is required is in arms control—any treaty the United States enters into must provide the right to deploy the same force levels as the other treaty parties.

Integrated Deterrence?

While a robust strategic nuclear deterrent undergirds everything the United States undertakes around the world, it is a necessary but insufficient counter to potential aggression in a world in which Russia, China, and even several rogue states maintain capable conventional forces as well as offensive space and cyber capabilities. While those particular threats are not the subject, per se, of Project Atom’s work, it would be wrong not to comment on them, however briefly. A credible deterrent must provide responses to all forms of a potential enemy’s aggression.

Given Russian and Chinese capabilities, the United States must continue to deploy powerful air, naval, and ground conventional forces, offensive and defensive counterspace systems, and world-class offensive and defensive cyber assets. There are significant gaps in these nonnuclear areas. For one, the United States currently lacks adequate offensive and defensive counterspace capability. In another example, given Moscow and Beijing’s extensive anti-access/area denial (A2/AD) capabilities designed to prevent U.S. naval forces from operating successfully in the Baltic and South China Seas, respectively, the United States requires but has not fielded the means—the Conventional Prompt Strike system—to destroy the A2/AD threat. While a joint Army and Navy program has developed this long-range conventional hypersonic missile, both service’s bureaucracies are treating deployment as a matter of routine business rather than an urgently needed requirement. Similarly, the Air Force tanker fleet is woefully inadequate to support a major war in the Pacific, let alone a world in which U.S. forces might have to fight in both Europe and Asia. The real issue in all of this is the non-responsive, process-oriented, and deeply risk-averse nature of the service bureaucracies—the organizations focus on numbers of platforms rather than needed capabilities, including for both cutting-edge technologies and mundane but essential items such as war reserve munitions. This problem is compounded by a defense-industrial base which has been deliberately allowed (even encouraged) to atrophy since the end of the Cold War and which requires major rejuvenation—a task in which the DOD and Congress must both play a role.

Finally, an effective deterrent requires integration of all of these military capabilities and, to a larger degree, integration of whole-of-government activities to deter aggression and prevent war. This is an area where the United States has not particularly excelled for decades; today, despite the administration’s rhetorical commitment to “integrated deterrence,” the DOD does not plan in an integrated manner. The bureaucratic barriers and baronial and territorial instincts of the various combatant command staffs have proved a major impediment to integrating regional and functional forces and even to planning most effectively for such employment—all despite well-meaning commitments at the four-star level in the Pentagon to create cross-cutting planning and operations. A failure to address this meaningfully will undercut U.S. combat capability globally. There are various ways to force the regional and functional combatant commands to plan in an integrated manner. All would be bureaucratically difficult to create, but the function is absolutely necessary.

Of all the various approaches, the best would be to build on the experience of the Omaha-based Joint Strategic Target Planning Staff, which was co-located with Strategic Air Command from 1960 until the demise of both in 1992. A new Joint Strategic Planning Staff, reporting to the chairman of the Joint Chiefs of Staff, should be created to ensure the geographic combatant commanders' war plans include not only air, ground, and maritime operations but also integrated space, cyber, and nuclear ones as well.

The Nuclear Weapons Complex

In the mid-1990s, the Clinton administration advocated for the adoption of the Comprehensive Nuclear-Test-Ban Treaty. While never ratified by the U.S. Senate, the treaty's existence and the administration's view of the international security situation led it to slash funding for the agency responsible for the maintenance and production of U.S. nuclear weapons: the National Nuclear Security Administration (NNSA). The result over time was a production complex housed more often than not in World War II-era buildings, unable to produce new uranium pits or new warhead designs, and largely focused on the life extension of existing weapons. Funding increases beginning in 2020 and continuing today have been unable to significantly change the capabilities of the nuclear weapons complex. Construction of new facilities has been delayed, and costs have risen accordingly. To exacerbate the situation further, significant numbers of skilled and experienced workers and scientists are reaching retirement age, and the NNSA has been unable to attract and retain adequate numbers of replacements. All of this has led to a situation where, despite having stellar leadership today, the NNSA has become the single greatest impediment to modernizing the U.S. nuclear deterrent. A recent NNSA internal study observed: "On the current path, warhead modernization programs, facility construction, and capability recapitalization will continue to slip and, even worse, we may not be able to attract and retain the needed workforce."¹¹⁷

There may be no good answers to solving this crucial but seemingly intractable problem.¹¹⁸ Drawing on the work of the 2014 Mies-Augustine report, it is possible to advance several potential remedies¹¹⁹:

- The NNSA should be removed from the Department of Energy (whose leadership's focus has traditionally been on non-defense issues) and be made an independent agency;
- The administration should accord the rebuilding of the nuclear weapons complex a "Moonshot-like" priority and act expeditiously to resolve the myriad problems which have made it a major vulnerability in the overall U.S. deterrent posture; and
- The administration should undertake the politically difficult but nonetheless necessary task of persuading Congress to remove NNSA funding from the Energy and Water Committees and place it under the Armed Services Committees.

Allies and Extended Deterrence

While somewhat of a truism, the fact is that the United States' biggest single advantage over Russia, China, and North Korea in international affairs is that it has allies and they do not. The United States shares democratic forms of government and a strong belief in the Western liberal political tradition with those allies. It also has strong trading relationships. But a key factor which binds the United States' European and Asia-Pacific allies is their perceived need for protection from blackmail, coercion, and attack from their nuclear-armed neighbors. Much of the concerns of U.S. allies faded after the end of the Cold War, only to return with heightened fears over the past four to five years, given Putin's murderous aggression against Ukraine and nuclear threats, Xi's

many attempts to intimidate Tokyo, Canberra, Seoul, and Taipei, and Kim's occasional outbursts. Reassuring allies that the United States can and will continue to protect them involves a mixture of diplomacy and demonstration of military capability; based on history and geography, the elements of that mixture are different in Europe than in the Asia-Pacific.

EUROPE

Faced with the threat of invasion by a large Red Army following World War II, and confronting an unwillingness to pay the sums deemed necessary to provide a conventional force equal to it, the United States and its European allies formed a defensive alliance—NATO—and based its defense posture principally on the threat of a nuclear response. The purpose of NATO was simple: to prevent a third major conventional war which would devastate the homelands of the European members of the alliance. Beginning in the mid-1950s, the United States began deploying thousands of mid-range and short-range weapons to NATO Europe for potential use in wartime by both U.S. and allied forces. This demonstration of military capability contributed to an effective deterrent throughout the Cold War. In the 1960s, NATO governments increasingly evinced concern about how the Europe-based weapons might be used in wartime and pressed for a consultative mechanism on the topic, an arrangement the United States agreed to in 1967.

Over the past 55 years, allied governments and their polities have remained essentially supportive of NATO's nuclear arrangements. The consultation process is long established and accepted. The size and scope of the deployment of U.S. nuclear weapons has been reduced dramatically as a result of the end of the Cold War, and the lowered threat perception derived from the demise of the Warsaw Pact and Soviet Union led to calls from some quarters for their complete removal. However, as Russia's aggressive nuclear diplomacy increased, coupled with its invasion of Georgia, its occupation of Crimea, and its February 2022 invasion of Ukraine, there is a general acceptance of the value of and need for NATO's nuclear-sharing arrangements. Indeed, Putin's declarative threats against NATO have heightened a collective awareness among publics, politicians, and governments of the danger posed by Russia. Many are and will be watching carefully how the Biden administration deals with the war in Ukraine, including potential Russian use of nuclear weapons; any perceived weakness will inevitably undermine confidence in the United States' commitment to defend NATO from Russian aggression. It will also be important politically, both within NATO's European members as well as among political elites in Washington, for alliance members to meaningfully carry out their commitments to increase their own defense capabilities. Augmenting U.S. military prowess with increased allied conventional (particularly ground) forces, cyber capabilities, and, to some much smaller extent, space assets will be seen as key to success here.

ASIA

The United States' extended deterrence posture in the Asia-Pacific has, mostly for historical reasons, been markedly different from that in NATO Europe. The possibility of war, except perhaps on the Korean peninsula, was largely discounted by regional allies historically. U.S. nuclear weapons had been deployed only in one Asia-Pacific allied nation, South Korea, and they were earmarked for wartime use solely by U.S. forces. With U.S. Navy aircraft carriers and patrol squadrons removed from nuclear roles at the end of the Cold War, the only U.S. non-strategic weapon available to the region was the nuclear-tipped Tomahawk SLCM, and it was retired without replacement by the Obama administration (over Japanese objections). Given the U.S.-centric nature of regional nuclear deployments, no consultative arrangements with Asian allies were ever created or sought.

Within the last 15 years or so, however, the need for both diplomatic and hardware solutions has emerged. Successive governments in Japan have been increasingly unsettled by China's provocative behavior in and

around Japanese airspace and its maritime borders. The steady buildup of Chinese and North Korean nuclear forces has led to concerns in Tokyo that there are “holes” in the U.S. extended deterrence umbrella, and senior politicians have even floated the idea that Japan should become a nuclear weapons state. Similar sentiments have emerged in Seoul as well.¹²⁰ The Obama administration sought to allay these concerns by establishing recurring nuclear policy discussions with both Japan and South Korea. While these discussions have been an important first step in restoring confidence in the extended deterrent, they are only that—a first step. Follow-on steps should include:

- The United States should proceed with the development and deployment of SLCM-N aboard U.S. submarines.
- The Australia-United Kingdom-United States (AUKUS) agreement should be expanded to include Japan and South Korea in a broad and loose alliance that features enhanced information and technology sharing, joint exercises, and joint planning conferences.¹²¹
- The United States should build a broad and loose alliance that also encourages allied development of conventional, cyber, and potentially space capabilities which are interoperable with and complementary to U.S. systems.
- Finally, the United States must put to rest the notion, popular in some quarters, that it cannot successfully fight simultaneously in Europe and the Pacific. Europe is primarily a ground war augmented by allied air power; the Pacific is a maritime and air war. Space and cyber will occur on a global basis regardless of which adversary the United States faces. The United States can fight successfully in both theaters with allied help.

Arms Control and Its Future

The pursuit of arms control grew from a cottage industry in the 1970s into an area of major U.S. and international government focus in the 1980s, in many ways obtaining a position of primacy among national security theorists and even some practitioners. Along the way, a fundamental truth was lost. Arms control is a tool which can contribute to national and international security and to reduced tensions. Arms control is not and never can be a substitute for a strong deterrent capability. As the United States enters the world of two potential nuclear adversaries, it should do so with a deterrent force equal to that situation. While advocates of maintaining New START (or a follow-on keeping its limits) will oppose any attempt to move beyond its limits, such a point of view is dangerous. Deterrence should be the United States’ first priority. Arms control agreements can moderate the threat, but the United States cannot allow arms control to undercut what it needs for deterrence—nor does it have to (more on this below). Finally, looking to the future, the United States should broaden the focus on great power arms control beyond intercontinental weapons to include all nuclear weapons, including short- and medium-range weapons as well as exotic and long-range ones. The rationale for this should be clear: Russian and Chinese nuclear weapons threaten U.S. allies (whom the United States has committed to defend), and any initial use of nuclear weapons would almost certainly begin not through intercontinental strikes but as a result of nuclear use in a war which starts in the theater. It is intellectually dishonest to argue that arms control is an important element of moderating international conflict and then to ignore the weapons most likely to be used first in a war.

Setting the above aside momentarily, it must be acknowledged that the future of arms control in the near term is bleak:

- It is difficult to conceive of how the United States can return to an arms control negotiation with Russia as long as Vladimir Putin remains its president.
- The Chinese government has long been dismissive of entering arms talks (and views transparency and inspection regimes—both fundamental to a successful arms control accord—as weakness).
- And disarmament is unrealistic and not in the cards. In this regard, it is instructive and curious that of the P5 countries, only the United States, the United Kingdom, and to some degree France are sensitive to the domestic and international criticism that they have not fulfilled their Article VI commitment of the Treaty on the Nuclear Non-Proliferation of Nuclear Weapons (NPT) (itself an ambiguous commitment based on the negotiating record and the U.S. government’s interpretation of it). Russia and China both appear impervious to such commentary, and international critics largely ignore Moscow and Beijing’s nuclear buildups.

Even before Russia destabilized Europe by invading Ukraine, the idea of arms control was under significant stress, as major actors showed an inclination to violate basic norms:

- Under Putin, Russia has violated nine treaties and agreements which his predecessors had signed with the United States.¹²² In addition, Russian air and naval assets, as an element of state policy, routinely violate the 1972 Incidents at Sea Agreement and the 1989 Agreement on the Prevention of Dangerous Military Activities.
- Chinese air and naval forces, as a matter of state policy, routinely violate the Code for Unplanned Encounters at Sea.

Furthermore, difficulties have arisen when sensitive sources have uncovered cheating, but the United States cannot expose the offender or inform allies or the public due to concerns about “sources and methods.” Russia’s violation of the Intermediate-Range Nuclear Forces (INF) Treaty is the poster child in this regard.

A Possible Way Forward

Beginning with two big “ifs”—if Putin is no longer ruling Russia in several years, and if Ukraine is able to successfully repel its Russian invaders to the degree it is prepared to sign a peace treaty with Moscow—it is possible to imagine a U.S.-Russian arms control treaty along the following lines:

- Washington and Moscow would agree that all deployed air-, naval- and ground-launched nuclear weapons on both sides would be subject to a new quantitative agreement. This would include traditional intercontinental weapons, exotic intercontinental weapons such as the Poseidon/Status 6 system, mid- and short-range nuclear weapons (to include land mines), dual-capable aircraft and B-61s in NATO, and the United States’ SLCM-N.¹²³
- The agreement would permit complete freedom to mix; within the overall agreed cap, each side would be free to declare, and alter in the future, subject to notification and inspections, the composition of its nuclear forces.
- Reporting and intrusive verification provisions similar to those found in START I would apply.
- China would be welcome to join the treaty’s initial negotiations or to join it after its entry into force.
- An entering rule for beginning negotiations would be that the negotiations would cover only nuclear weapons and dual-capable weapons systems; missile defense, offensive space systems, and offensive cyber systems—the inclusion of any of which would doom a successful conclusion and ratification—would be excluded.

Before entering into negotiations, the U.S. government would need to determine the size and composition of the nuclear arsenal it requires to have a successful deterrent against Russia and China both for itself and for its allies, and it would have to protect that number in the treaty's outcome. While such an idea might appear farfetched and totally unrealistic, it is difficult to imagine any other negotiated approach which would provide security for the United States and its allies.

As a final note, it would be important for the United States, Russia, and China to seek, urgently and before additional tests might occur to validate a system's reliability, a ban on fractional orbital bombardment systems. China's deployment of such a system, allowing it to conduct an unwarned decapitation strike against its enemies' nuclear command and control apparatus, would be a highly destabilizing act. Banning this highly dangerous technology before it reaches maturity would contribute to nuclear stability and inhibit its adoption by other nuclear powers.

Conclusion

Students of U.S. history understand that the United States accepted its role as the protector of Western European and Asian-Pacific democracy with great reluctance. The role was thrust upon the United States in the wake of two world wars that devastated Europe and Asia, and in light of perceived threat of further invasion and conflict by Russia and China. Nuclear deterrence and extended nuclear deterrence have been fundamental to the United States' success in this role.

It is worth considering the number of times Europe's great powers went to war with one another after 1648, the date when the Treaty of Westphalia ushered the modern nation-state into existence. From 1648 to 1800, there were at least seven significant wars. From 1800 to 1900, there were at least six significant wars, and that includes lumping all the Napoleonic Wars into one and similarly counting the three wars of Italian independence as one. In 1914, there was World War I, the "war to end all wars," whose massive carnage and destruction of a generation of European males was not sufficient to prevent World War II.

Then, after 1945, a historic pause suddenly began. Did humankind change? Did the nature of governments change? No, the existence of nuclear weapons made war between the major powers too dangerous to contemplate as an instrument of prudent policy. As long as the United States maintains a strong deterrent, and as long as potential enemy leaders act rationally, it will be possible to prevent major war. Popularly appealing but ill-thought-out slogans such as "reducing the role of nuclear weapons" both threaten the basis of the United States' policy success over the past many decades and appear risible in a world in which potential enemies have demonstrably increased their reliance on nuclear weapons and routinely employ nuclear blackmail to try to intimidate the United States and its allies.

Detering Two Peer Competitors for U.S. Deterrence Strategy

Time to Innovate

By Leonor Tomero

Geopolitical reality and nuclear modernization in Russia and China will soon require the United States to deter two peer competitors. Meanwhile, dramatic technological changes are emerging from the commercial sector in areas related to deterrence. These changes include not only new nuclear dangers but more broadly increased risks of miscalculation and rapid escalation that could lead to nuclear war. The United States needs to adapt and strengthen its deterrence posture against these new challenges and use innovation for deterrence resilience to prevent nuclear war.

Given the increasing threat environment and higher risks of inadvertent escalation, the core objective of future U.S. strategic deterrence should be to prevent nuclear war. This goal entails concurrently deterring conflict with Russia and China as early as possible by denying any potential adversary the benefit of attack while reducing the risk of escalation to nuclear weapons use. While nuclear deterrence remains central to national security, the United States should harness innovation to pursue a stable deterrence architecture that is more resilient against inadvertent escalation. This paper will examine:

1. how increasing threats, technological disruption, and increased risk of miscalculation are impacting deterrence strategy, including why and how deterrence doctrine must evolve to address new threats and prevent nuclear war, such as the need to adapt nuclear deterrence strategy;
2. how modernization should prioritize survivable nuclear forces and provide modern capabilities to move deterrence to the left, meaning strengthen deterrence earlier in a crisis or conflict, as well as why modernization should leverage innovation and emerging technologies, including artificial intelligence, new space and cyber domains, and the private sector, to enhance deterrence and reduce the risk of miscalculation;

3. extended deterrence, including the importance of interoperability; and
4. arms control, including applying emerging technologies.

In summary, preventing nuclear war now demands a better understanding of emerging escalation pathways and a concerted effort to move deterrence to further “left” of nuclear weapons use. Incremental changes to twentieth-century architecture and Cold War strategy will not keep pace with technological change. To reliably deter U.S. adversaries, a modernized deterrence should recognize that emerging technologies and commercialization of outer space are critical to strategic stability and resilience. This requires harnessing new capabilities and private sector innovation to ensure resilience through survivability, adding decisionmaking time and opportunities for de-escalation, and undertaking rapid acquisition to reduce the risks of unintended nuclear war.

Deterrence Strategy

Adversary threats are shifting across several domains—nuclear, space, and emerging technologies—and, when combined with an increased risk of miscalculation and inadvertent escalation—could lead to nuclear war. To understand the requirements for deterrence strategy, it is critical to understand the scope of new threats.

INCREASING NUCLEAR THREATS

First, nuclear threats are growing, including in sheer numbers as well as increased likelihood of nuclear weapons use. China is adding hundreds of nuclear weapons and will reach at least 1,500 by 2035.¹²⁴ China is aggressively modernizing its nuclear force, developing launch-on-warning capabilities, and diversifying its nuclear weapons, achieving a nascent nuclear triad.¹²⁵ Combined with a new launch-under-attack posture that exacerbates time-pressure on Chinese decisionmakers and its persistent refusal to negotiate nuclear constraints or risk reduction, this expansion could increase the risks of miscalculation and of nuclear weapons use. China’s modernization implies new basing modes and a nuclear warfighting capability, which introduces risks of miscalculation not present in smaller, less ready forces.

Meanwhile, Russia is taking more risks with nuclear weapons. It has implied that it may use nuclear weapons to sustain its illegal war against Ukraine. It is also expanding its numbers of nonstrategic nuclear weapons and plans to deploy some of them in Belarus.¹²⁶ Russia is developing novel nuclear weapons systems to overcome potential U.S. missile defenses and could rapidly upload nuclear weapons if and when New START terminates. Russian leadership is also increasing its reliance on nuclear weapons and dangerously has raised the specter of using nuclear weapons in Europe, increasing the risk of inadvertent escalation.¹²⁷

In addition, China and Russia have committed to a friendship “without limits.”¹²⁸ While a formal alliance between Russia and China still seems unlikely today, they are cooperating more closely as their interests align to counter the United States. Russia and China are deepening economic and defense cooperation.¹²⁹ For example, they have held bilateral summits, and Russia is supplying enriched uranium for China’s fast breeder reactors.¹³⁰

These nuclear threats and the prospect of two nuclear peer adversaries are raising questions about whether the United States must match, or prepare to match, adversary advances qualitatively and quantitatively, whether it should increase its numbers of nuclear weapons, and whether it should develop new low-yield nuclear weapons. U.S. nuclear modernization could use open production lines and new investments to increase numbers of intercontinental ballistic missiles (ICBMs), ballistic missile submarines (SSBNs), bombers,

and associated warheads. Admiral Charles Richard, former commander of U.S. Strategic Command, testified in March 2022 that more U.S. nuclear weapons may be needed.¹³¹ After Russia suspended New START, House Armed Services Committee chairman Mike Rogers stated, “All options must be on the table, including deploying additional nuclear forces and increasing the readiness of our nuclear triad.”¹³²

THE IMPACT OF TECHNOLOGICAL DISRUPTION ON DETERRENCE STRATEGY REQUIREMENTS

Strategic threats are more complicated than just increasing the number and types of nuclear weapons. Considering the nuclear threat in a vacuum will lead to flawed recommendations. China and Russia are concurrently pursuing emerging and non-kinetic technologies, including cyberattacks, electronic warfare, and directed energy attacks.¹³³ Both China and Russia have expanded and demonstrated counterspace capabilities, including anti-satellite weapons, that threaten U.S. and allied space assets.¹³⁴ According to the 2020 U.S. Defense Space Strategy, “China and Russia each have weaponized space as a means to reduce U.S. and allied . . . freedom of operation in space.”¹³⁵ In response, the United States in 2017 and the North Atlantic Treaty Organization (NATO) in 2019 declared space a new warfighting domain.¹³⁶

The Office of the Director of National Intelligence noted in its Global Trends 2040 report that “in this more competitive global environment, the risk of interstate conflict is likely to rise because of advances in technology and an expanding range of targets, new frontiers for conflict and a greater variety of actors, more difficult deterrence, and a weakening or a lack of treaties and norms on acceptable use.”¹³⁷ Further increasing this risk, a strategic conflict with China or Russia could begin in the context of a regional conventional conflict and escalate rapidly in the space or cyber domains, leading to strategic effects such as targeting and potentially endangering and degrading strategic deterrence capabilities or critical infrastructure.

In addition, China and Russia are taking a much broader view of conflict and using nontraditional tools, including disinformation, to attack U.S. political cohesion and decision space. They have demonstrated the willingness and capability to use emerging technology to disrupt the cohesion of the United States’ society and its constitutional democracy by interfering in elections (as Russia did in 2016 and 2020), targeting critical infrastructure, and sowing division.¹³⁸ Lieutenant General Jack Weinstein, former Air Force deputy chief of staff for strategic deterrence and nuclear integration, observed in 2021:

We are having the wrong national-security debate in this country. Neither Russia’s nuclear arsenal, China’s rapidly modernizing nuclear force, or even North Korea’s advancing nuclear capability pose the most pressing existential threat to this nation. International and domestic disinformation campaigns targeting Americans is our most pressing and dire threat to the security of our republic.¹³⁹

This use of new tools and the expanding reach of disinformation campaigns pose potentially enormous dangers to deterrence, which is fundamentally about using information to influence adversary behavior. Successful weaponization of social media could tempt U.S. adversaries to believe they can degrade, shape, or otherwise limit U.S. deterrence resolve, leading to dangerous new possibilities for miscalculation. In her seminal article, “Wormhole Escalation in the New Nuclear Age,” Dr. Rebecca Hersman, director of the Defense Threat Reduction Agency, stated:

Adversaries can amplify effects, obscure attribution, and prime the information space to their advantage long before a crisis begins, as well as shape it during such a crisis. By promoting false narratives, flooding the information zone with contradictory claims, manipulating social and economic institutions, and instigating general or targeted social unrest, potential adversaries can

break confidence in U.S. and allied institutions, increase distrust and confusion, and coerce desirable outcomes at lower levels of conflict.¹⁴⁰

Nuclear experts such as Dr. Heather Williams of CSIS are exploring how social media may affect escalation and deterrence, and more focus is needed in this area.¹⁴¹ Attacks on U.S. deterrence resolve could be compounded by new vulnerabilities and attack surfaces in the space and cyber domains, sowing further confusion, targeting the United States' will to fight, and degrading critical capabilities. These new attack vectors are expanding conflict and impacting deterrence in unprecedented ways that must be better understood. New ways to target and influence either senior decisionmakers or the broader public will affect deterrence credibility and strategy.

THE INCREASED RISK OF MISCALCULATION AND INADVERTENT ESCALATION LEADING TO NUCLEAR WAR

The risk of miscalculation that led to near misses during the Cold War has not been sufficiently prioritized as a key consideration in deterrence strategy and has become an even greater danger today. The Cold War is replete with instances of close calls. Aside from the 1963 Cuban Missile Crisis, when the word came perilously close to nuclear war, examples of false warning triggering increased nuclear alerts include the 1979 U.S. false warning of a Soviet nuclear missile attack; the 1985 Able Archer exercise, whereby the Soviets mistook a NATO military exercise as initial steps of a nuclear invasion of the Soviet Union; and the 1995 Norwegian sounding rocket mistaken for U.S. nuclear missiles.¹⁴² Technology improvements and a few historic policy solutions such as the Hot Line and Open Ocean Targeting agreements contributed significantly to risk reduction. However, U.S. deterrence posture generally has, and continues to be, focused on intentional lethality, to the exclusion of unintentional escalation.

Today, new technologies and domains as well as risk-prone bravado from adversaries are increasing the risks of unintended escalation. In their book, *The Age of AI*, Henry Kissinger, Eric Schmidt, and Daniel Huttenlocher warn that “the current and foreseeable increased threat of inadvertent rapid escalation and miscalculation that could lead to nuclear use or large-scale nuclear war represent a renewed threat that was never adequately addressed.”¹⁴³ Specifically, these risks are exacerbated by leaders who miscalculate or are willing to take more risks. Putin takes extreme risks. Examples range from Russia's invasion of Ukraine, to threatening the use of nuclear weapons, to expanding Russia's reliance on non-strategic nuclear weapons in its so-called “escalate-to-deescalate” doctrine, to suspending implementation New START. U.S. national defense must be resilient against Putin's tendency to miscalculate.

Similarly, the risk of miscalculation in the context of a war with China over Taiwan is significant. China is fielding a nuclear triad and new launch-on-warning capabilities as a major departure from its decades-long minimum-deterrence strategy. China lacks the shared experience of the Cuban Missile Crisis and decades of effective nuclear arms control with the United States. This absence of shared understanding is exacerbated by China's aggressive pursuit of emerging technologies, including artificial intelligence.

Ambiguity and conflict in space imply unprecedented challenges for deterrence, due in part to the difficulty of attribution in the space and cyber domains, the reversibility of some forms of attack, the brittleness of legacy systems, and the potential for strategic attacks that materially degrade critical deterrence capabilities without any kinetic attack on the ground and, potentially, without loss of life, such as against space nuclear command, control, and communications (NC3) capabilities.¹⁴⁴ An adversary may attack assets in space in the context of a conventional war, but those could be perceived as escalatory if they targeted strategic assets such as nuclear command and control satellites (which currently provide tactical as well as strategic communications). In

addition, attacks against space assets, such as the Global Positioning System could prove more escalatory than an adversary might intend, as many systems depend on it.

EVOLVING DETERRENCE DOCTRINE AND STRATEGY TO ADDRESS NEW THREATS AND PREVENT NUCLEAR WAR

While the United States faces two peer competitors and new threats have increased the risk of nuclear war, nuclear deterrence doctrine and strategy have largely been static for over 40 years. Kissinger, Schmidt, and Huttenlocher note that “the management of nuclear weapons, the endeavor of half a century, remains incomplete and fragmentary” and that the “unsolved riddles of nuclear strategy must be given new attention and recognized for what they are: one of the great human strategic technical and moral challenges.”¹⁴⁵

New threats require that the United States adapt its doctrine and strategy not just because of increased numbers, but more so because of new non-nuclear strategic capabilities that could precipitate a conflict much earlier in a crisis, nuclear conflict, or conventional war. Sputnik may have been the single greatest disruption to Cold War deterrence, dwarfing the supposed bomber and missile “gaps.” Today, the United States should focus not just on numerical gaps but on the emergence of the next Sputnik moment.

More specifically, the heightened nuclear threat in the context of the war in Ukraine and the increased risk of conflict over Taiwan, combined with a potential future in which neither Russia nor China participate in strategic stability and risk reduction through negotiation, demand a new deterrence strategy. Ignoring the need for this shift may mean that in a crisis or conventional conflict, the United States could suffer debilitating losses well before a nuclear conflict. As Dr. Rebecca Hersman stated, “Increasingly capable and intrusive digital information technologies, advanced dual-use military capabilities, and diffused global power structures will reshape future crises and conflicts between nuclear-armed adversaries and challenge traditional ways of thinking about escalation and stability” and “will require new concepts and tools to manage the risk of unintended escalation and reduce nuclear dangers.”¹⁴⁶

The United States urgently needs to better understand how emerging technologies, cyber and social media, and space affect nuclear deterrence. At the 20th anniversary of Nunn-Lugar, late secretary of defense Ashton Carter noted “the nuclear systems that supported the arsenals of the United States and the Soviet Union were fundamentally social and human.”¹⁴⁷ As another example of policymakers’ recognition of these new attack vectors, the FY 2022 National Defense Authorization Act mandated an independent review of the safety, security and reliability of U.S. nuclear weapons (the so-called “new failsafe report”), which mandated an examination of potential cyber and other vulnerabilities.¹⁴⁸

A novel deterrence concept for reducing the risk of nuclear war starts with moving deterrence to the left, meaning strengthening deterrence well before the threat of nuclear war. While nuclear deterrence remains central to national security, the United States needs a more resilient and broader strategic deterrence strategy that prevents escalation earlier in a crisis or conflict. Because of the risk of rapid or inadvertent escalation in the modern strategic environment and because of the inability to ensure the United States will be able to “restore deterrence” once nuclear conflict begins, reducing the risk of nuclear war increasingly means reducing the risk of conventional war. Herman Kahn’s historic effort to strengthen nuclear deterrence by thinking “right of boom,” to consider the difference between potential aftermaths of nuclear war scenarios, has taken planning for nuclear warfighting to implausible extremes. As emerging technologies imply new counterforce vulnerabilities and escalation pathways, as well as opportunities to control these pathways, U.S. deterrence planning must extend just as far “left of boom” to prevent nuclear war.

ADAPTING NUCLEAR DETERRENCE STRATEGY

With regard to the narrower question of nuclear deterrence and strategy requirements to address two peer competitors, the United States should balance reflexive appetites for additional nuclear weapons with other measures and capabilities to deny adversaries any benefit from nuclear weapons use. Nuclear deterrence requirements must be distinguished from requirements to meet military objectives if deterrence fails.¹⁴⁹ With 3,750 nuclear warheads in the U.S. nuclear stockpile (as of 2020),¹⁵⁰ no changes are needed to deter both Russia and China. Referring to the U.S.-Russian nuclear balance, J. Robert Oppenheimer stated in 1953 that “Our twenty thousandth bomb will not in any deep strategic sense offset their two thousandth.”¹⁵¹ While the United States maintains rough parity with Russia today with regard to strategic nuclear weapons (and not with regard to nonstrategic nuclear weapons), there is no evidence that building up conveys any meaningful added capability that would be required either politically or militarily. Despite claims of a perceived deterrence gap requiring new low-yield nuclear weapons, there is no evidence of such a gap.¹⁵² The United States maintains a nuclear triad comprised of varied, complementary, and redundant capabilities, including a variety of low-yield options, such as air-launched and now sea-based options with deployment in 2019 of the W76-2 nuclear-capable submarine-launched ballistic missile (SLBM-N).¹⁵³ There is no evidence that adding more low-yield options would deter adversaries from expanding their nuclear arsenals or considering the use of a low-yield nuclear weapons in the context of losing a conventional fight. While proponents of additional low-yield options point to thousands of Russian nonstrategic nuclear weapons, this claim sidesteps that the main driver for Russia’s non-strategic arsenal is NATO’s conventional superiority.¹⁵⁴

In the case of a limited nuclear war escalating to a larger nuclear war, U.S. deterrence capability—including the numerical strength and reliability of its nuclear arsenal, with more than 1,550 deployed strategic nuclear weapons (and the capacity to upload in the absence of New START, and to keep production lines open)—is also beyond dispute.¹⁵⁵ Therefore, nuclear deterrence does not require new or additional nuclear weapons.

However, the question remains how many nuclear weapons would be needed to meet U.S. military objectives if deterrence fails (including, for example, counterforce targets and damage limitation objectives). Current numbers appear sufficient to fight one nuclear war while deterring another. No changes in U.S. numbers will be needed before the 2030s as China builds up its arsenal over a decade to its goal of at least 1,500 nuclear weapons by 2035. Nearing 2035, the current objectives for nuclear weapons employment in the event of escalation to a large-scale nuclear war with China and Russia may require higher numbers to cover additional targets. The value of meeting these objectives should be evaluated critically against adversary reactions to new capabilities.

First, adding more low-yield nuclear options will not keep a limited nuclear war limited. Rather, it may lower the threshold for using nuclear weapons in the context of a regional war, risk normalizing planning for extensive, multi-round nuclear warfighting, and fail to prevent uncontrolled escalation. There is no evidence that additional low-yield options (including more prompt options for using low-yield nuclear weapons) would deter Russia from using low-yield nuclear weapons. Instead, managing deterrence of limited nuclear war requires credibly signaling that an adversary will not gain any military or political advantage from using nuclear weapons. Strong warnings from President Joe Biden and attention to the risk of miscalculation probably helped defuse the risk of Russian use of nuclear weapons in the fall of 2022.¹⁵⁶ Adding ever more low-yield nuclear weapons cannot substitute for credible threats clearly communicated.

Second, beyond deterring limited nuclear war and because escalation beyond a limited war cannot be controlled reliably, the United States needs to consider the possible scenario of a large-scale nuclear war.

This threat is not new. The new question is whether the United States should prepare for two large-scale nuclear wars (one with Russia and another with China, in the unlikely case of strategic alliance or in the case of opportunistic aggression). The author's answer to this question is no, as it is not in any way realistic for the United States to fight two nuclear wars to acceptable outcomes—one large-scale nuclear war would end civilization as we know it. During a massive nuclear exchange with Russia (or China), a U.S. president would be faced with catastrophic loss of life, devastation, economic ruin, and humanitarian abyss. It is hard to imagine any likely geopolitical circumstance that would require a second, concurrent large-scale nuclear war. Amid or after a major nuclear war with Russia or China, it is highly unlikely that a U.S. president would have any plausible incentive to fight a second large-scale nuclear war. Thus, a scenario where the United States fights one nuclear war and deters another nuclear war is realistically sufficient. The specific assumptions that drive requirements for capabilities to employ large numbers of nuclear weapons against two peer competitors simultaneously should be assessed critically against alternatives (such as building up conventional capabilities) that may be more useful for deterring or fighting a war against China, Russia, or both.

The United States needs a careful re-look at objectives (including counterforce targets and damage limitation). What classes of targets is the United States holding at risk? How much damage or what kind of destruction is needed, including for damage limitation? For how long are these effects needed and with what conventional or nuclear capabilities can they be delivered? Military capacity and options must be weighed against the political reality and likelihood of what a U.S. president would be inclined to do. Are nuclear weapons necessary for all current targets? If additional conventional weapons are needed, what kind and how many? What risks of arms-racing or escalation do new capabilities pose? These considerations need serious and informed debate and should not be papered over. If this review must be classified (because objectives and targets are classified), Congress and the public should ensure that it is done rigorously.

Preventing nuclear war demands that the United States address the risks of miscalculation and unintended escalation directly. Theories of victory in nuclear war must be balanced against this imperative. In the face of the renewed and dynamic risk of nuclear war, the United States must pursue creative solutions rather than become self-satisfied with decades-old answers that are now insufficient or ill-suited to new threats. The United States must question and assess the assumptions of deterrence to ensure they are adapted to new environments, new threats, and effective modern deterrence requirements and objectives beyond arithmetic and implausible political scenarios of two large-scale nuclear wars.

Modernization

MODERNIZING NUCLEAR CAPABILITIES BY PRIORITIZING SURVIVABILITY

A strategy that drives higher numbers of vulnerable weapons is ill-suited to stable deterrence. Matching on number of silos and missiles will lead to a dangerous, expensive, and counter-productive arms race. The United States must move beyond nuclear modernization constrained to incremental changes to a twentieth-century construct of vulnerable platforms and architectures. In this context, silo-based ICBMs are more vulnerable than they were in the 1960s because they are use-or-lose weapons if attacked and drive short decision times.

While the United States may not need additional nuclear weapons, it does need new concepts and capabilities that are survivable for stable deterrence. When the triad was first deployed, strategic nuclear weapons platforms were survivable. Recognizing adversary advances in defensive capabilities and improved accuracy, the United States should adapt its modern nuclear forces to ensure they remain survivable. Modernization

should prioritize survivable platforms and architectures to provide stability and resilience. The United States must think more creatively about basing modes and concepts of operation. Specifically, if additional platforms are needed, the United States should prioritize adding SSBNs and shift to, or at least include, the option of mobile ICBMs (that would be kept in garrison but could be flushed in a crisis or conflict), understanding potential escalation risks from flushing mobile missiles (as there would be with dispersing nuclear bombers or putting more SSBNs to sea). The United States must prioritize resilient and layered nuclear command, control, and communications (NC3) systems. While much of the financial investments and planning focus on new platforms and warheads, the critical need to upgrade NC3 systems is usually less salient. U.S. nuclear modernization must also prioritize infrastructure resilience and more agility to adapt to new requirements.

MODERN CAPABILITIES THAT MOVE DETERRENCE TO THE LEFT

Modernization plans must account for historic changes beyond the growth of Russian and Chinese nuclear arsenals that will impact deterrence well before consideration of using nuclear weapons. The United States must apply solutions to prioritize and adequately address the increased risk of miscalculation rather than further exacerbating this risk. The Cold War showed that deterrence architectures can be more or less stable against arms racing and in crises. Modernizing strategic deterrence by moving deterrence to the left requires building more stable architectures by using new capabilities including cyber, space, private sector innovation, and resilience, including rapid acquisition. Conversely, without these tools, vulnerabilities may emerge that threaten debilitating losses early in a conflict or result in the unproductive option of escalating to using nuclear weapons first. The United States should pursue the most stable deterrence architecture possible with the best available technology.

INNOVATION

New capabilities are transforming the battlefield, moving beyond modernization of the nuclear triad and beyond a twentieth-century construct. Ranking member of the House Armed Services Committee Adam Smith noted in a broader context that “we need to modernize deterrence by updating . . . the military to the modern fight: information systems, missiles, drones, missile defense, counter-drone—we need to get better at these things. Large legacy platforms still have a place, but they are not as invulnerable as they used to be.”¹⁵⁷ Legacy systems may no longer be optimized or appropriate for effective nuclear deterrence, and new technologies offer new tools. Air Force chief of staff General Charles Q. Brown and commandant of the U.S. Marine Corps General David H. Berger wrote in a 2021 article that “without a fundamental reexamination of the concept of readiness, we will continue to spend limited resources on maintaining legacy capabilities, at the expense of investing in the modern capabilities the United States needs to compete with the People’s Republic of China and Russia.”¹⁵⁸ This warning should be applied to strategic deterrence.

“The threat that leaves something to chance” has been interpreted as nuclear threats that would lead to millions of civilian deaths. The United States should not be satisfied with an approach that unduly risks its national survival and endangers human civilization. The United States should prefer a strategic posture that is stabilizing, depends less on chance (or on Vladimir Putin or the Chinese Communist Party), and provides options other than rapid escalation toward nuclear war. To achieve a more modern and stable deterrence architecture, the United States should lead through innovation to create options that do not force escalation or lead to mass annihilation of civilians. U.S. deterrence that reflects U.S. values is inherently more credible than threats that do not. Schmidt notes that “the ability to innovate faster and better—the foundation on which military, economic, and cultural power now rest—will determine the outcome of the great-power competition between the United States and China.” He continues, “At stake is nothing less than the future of free societies,

open markets, democratic government, and the broader world order. . . . Silicon Valley’s old mantra holds true not just in industry but also in geopolitics: innovate or die.”¹⁵⁹ Innovation is the United States’ unique competitive edge vis-à-vis China and Russia.

EMERGING TECHNOLOGY AND SPACE: NEW KEYS TO DETERRING CONVENTIONAL WAR AND TO PREVENTING ESCALATION

Artificial Intelligence

Being in a strategic competition with China and Russia means understanding and managing competition in AI and emerging technology. AI and machine learning (including machine reinforcement) could determine the outcome of a crisis or conflict early. Marc Andreessen, founder of a16z, stated in 2011: “Software is eating the world,”¹⁶⁰ meaning that the virtual is displacing the material across the global economy. Trae Stephens, founder of the Founders Fund, more recently said that “software is finally eating the battlefield, whether the defense industry likes it or not.”¹⁶¹ Last year, Gilman Louie observed that “tomorrow it is real-time speed, algorithm warfare. It’s gonna be algorithms trying to outsmart the other algorithms. It’s gonna be machine-on-machine, algorithm-on-algorithm. Those are the systems of the future, and that requires total integration.”¹⁶² AI and machine learning offer new solutions.¹⁶³ Quantum computing will also allow faster processing of even larger amounts of data. Eric Schmidt warned recently that a breakthrough in artificial general intelligence (AGI)—a more comprehensive AI, which is currently used to solve discrete problems—“could usher in an era of predominance not unlike the short period of nuclear superiority the United States enjoyed in the late 1940s.”¹⁶⁴

AI and big data processing are key to enable faster and better information for decisionmakers, and support “information dominance.” Effective and rapid information could provide time warning of adversary action, holding them accountable and increasing options for de-escalation. Noting that the military currently processes 2 percent of the data it collects, General Glen VanHerck, commander of U.S. Northern Command, emphasized that “we can’t apply what I say are industrial age, industrial base processes to software-driven capabilities in today’s environment,” adding that “machines . . . can start counting numbers and tell you when there’s changes in . . . vehicles in a parking lot, vehicles in a weapons storage area.”¹⁶⁵ The early impact of emerging technology on the battlefield is already becoming apparent; as Schmidt noted: “Ukraine offers a preview of future conflicts: wars that will be waged and won by humans and machines working together.”¹⁶⁶

Space

Second, space is a key tool for increasing survivability and transparency, reducing the risk of surprise in a crisis or conflict, and increasing accountability of U.S. adversaries. Cheaper and ubiquitous space imagery is a tool that has already transformed conflict with Russia. The war in Ukraine has demonstrated the value of unclassified commercial imagery from space start-ups. Capella’s synthetic aperture radar imagery can see through clouds, and space imagery from Maxar and Planet have provided the world with irrefutable images of Russia’s brutal invasion and intent to subvert the global order, unifying U.S. and European allies, including by documenting advancing Russian tank columns and the evidence of Russia targeting Ukrainian civilian infrastructure such as apartments and hospitals.¹⁶⁷ Drone- and space-provided images also showed columns of tanks stopped due to mechanical and logistical problems, laying bare Russia’s military readiness challenges.¹⁶⁸ As another example of new tools giving the world sharable information, open-source analysis is providing rapid information, with Google Maps revealing the exact time that the Russian invasion began, even as Russia denied that they were invading Ukraine.¹⁶⁹

To this end, the United States must innovate to adapt its space capabilities and architectures and make them

more survivable. General John Hyten, former vice-chairman of the Joint Chiefs of Staff, noted the vulnerability of a “few juicy targets” in space and the need to change acquisition strategy and architectures.¹⁷⁰ Making space resilient means using various orbits and more numerous, smaller and cheaper satellites at proliferated low Earth orbit (pLEO) to complicate attack options, and using both military and commercial systems for added layers of operational capability. The Space Development Agency, the U.S. Space Force, and the Missile Defense Agency are deploying a resilient missile warning and tracking constellation in pLEO and medium earth orbit and are developing cheaper and smaller payloads to provide a mesh-layer of redundancy.¹⁷¹ Moreover, Congress is rightly prioritizing tactically responsive launch and tactically responsive space capabilities. In addition, disaggregation (not comingling tactical and strategic communications capabilities on the same satellite) will also enable a more stable deterrence architecture that reduces the risk of inadvertent escalation.

Private Sector

Third, for both the space and cyber domains, an increasing share of the infrastructure necessary for strategic deterrence is owned by private sector companies, such as SpaceX and Google as well as hundreds of new start-ups such as Planet. For example, SpaceX has provided Ukraine with receivers and access to Starlink connectivity, though it also has sought to limit this access.¹⁷² The United States needs to partner with the private sector to move deterrence left of mass destruction. In *The Age of AI*, Kissinger, Schmidt, and Huttenlocher state that “the expertise required for technological preeminence is no longer concentrated in government. . . . [A] process of mutual education between industry, academia, and government can help . . . ensure that . . . AI’s strategic implications are understood in a common conceptual framework.”¹⁷³ Creating the incentives and culture to leverage private sector innovation is crucial to national security. Former House Armed Services Committee chairman Mac Thornberry warned, “We need a culture of collaboration that opens new pathways to work with the private sector, relooks at our approach to interactions with outside organizations and reframes the department [Department of Defense] as open to sharing research and information rather than one that is uncooperative both internally and externally.”¹⁷⁴

Leveraging private sector innovation requires processes for agile and rapid acquisition. Congress enabled the Department of Defense (DOD) to conduct more rapid acquisition in section 804 of the FY 2016 National Defense Authorization Act. While the DOD is beginning to leverage transformational breakthroughs and innovation in the private sector for national security, sustained and focused senior leadership and new processes to break through legacy bureaucratic challenges will be required. General Hyten noted “the Department of Defense doesn’t know how to buy it [innovation]. We think we can buy software like we buy tanks.”¹⁷⁵ Schmidt warned that “business as usual will not do. Instead, the U.S. government will have to overcome its stultified bureaucratic impulses, create favorable conditions for innovation. . . . It needs to commit itself to promoting innovation in the service of the country and in the service of democracy.”¹⁷⁶ Pockets within the DOD, such as AFWERX, SPACEWERX, the Defense Innovation Unit, and the Space Development Agency, are establishing an innovative acquisition culture that incentivizes using private sector innovation, allowing early failure and learning, and prioritizing rapid acquisition. Continued focus and expansion of these models are necessary.

Extended Deterrence and Assurance

Alliance, like innovation, is at the core of the United States’ competitive edge and U.S. strength to address Russian and Chinese threats. Strengthening extended deterrence and alliances requires increasing partnership and interoperability with allied conventional deterrence capabilities. Allied and partner contributions to

conventional deterrence, missile defense, and innovation significantly enhance deterrence and help move deterrence to the left to prevent a regional conventional war. For example, the European Union's Innovation Fund could enhance deterrence and rapidly contribute new commercial and innovative capabilities.¹⁷⁷ To better leverage U.S. international partnerships and to maximize capacity and redundancy for deterrence, the DOD should prioritize processes for enabling interoperability with European and Asian allies' defense systems while safeguarding cybersecurity. Making progress on interoperability entails not only focused senior leadership but also overcoming deep-seated bureaucratic stumbling blocks, including overclassification and export control hurdles.

Increased NATO and European cohesion in the face of Russia's invasion of Ukraine and unified support for Ukraine, including significant funding and transfers of military equipment to Ukraine as well as financial sanctions on Russia, strengthen deterrence to protect NATO countries. These actions also strengthen deterrence in the Pacific as China assesses lessons learned with regard to potential implications of invading Taiwan. Japan and South Korea's attendance at the 2022 NATO summit as observers and hosting of NATO secretary general Jens Stoltenberg in 2023 indicate opportunities for closer defense cooperation and strengthening unity among U.S. allies in the face of the growing Russian and Chinese threats.¹⁷⁸

Credible assurance is a product of presidential and senior-level communication and engagement more than boutique capabilities. Consultation and understanding U.S. conventional and nuclear forces are key to credibility. Credible assurances to U.S. allies have been undermined by a range of actions, including (1) promising unnecessary and controversial new nuclear capabilities (such as the SLCM-N, which the Trump administration proposed and the Biden administration canceled); (2) focusing on unrealistic or difficult-to-execute new deployments of platforms that are unsuited to temporary forward deployment (such as promising forward deployment of nuclear-capable dual-capable aircraft to Asian allies); or (3) discussing new permanent stationing of forward-deployed nuclear weapons in allied territory in Asia (which would likely contravene the Treaty on the Non-Proliferation of Nuclear Weapons). Instead, the United States should increase both tabletop exercises and joint military exercises; enable a better understanding of nuclear deterrence through deeper and frequent consultations; rely on and demonstrate eminently forward-deployable nuclear platforms such as B52s, B2s, the future B21s, and submarines; and increase joint senior public messaging to adversaries of allied unity (as Jens Stoltenberg has done within NATO).¹⁷⁹

Arms Control

While future arms control would continue to significantly benefit national security and continues to be possible with effective U.S. and Russian (and Chinese) leadership, it seems unlikely absent a political breakthrough that would allow both effective international negotiations and domestic political support.

The specific tool of arms control—meaning legally binding constraints on nuclear platforms—may no longer be available to maintain strategic stability, and New START may expire without any follow-on treaty. Russia suspended implementation of the New START, which expires in 2026, leading to the risk of an impending new era without verifiable nuclear weapons limits. It is unclear whether this latest development is a signal that Russia is gambling with New START to seek leverage in its losing war in Ukraine, or whether it is willing to abandon legally binding nuclear arms control as a tool for predictability for the first time in six decades.¹⁸⁰ In the United States, arms control has become dangerously polarized, and the U.S. Senate no longer has the expertise and long-standing bipartisan agreement that arms control benefits national security.

The United States must continue to press for follow-on nuclear weapons constraints on the total number of nuclear warheads (not just the number of platforms or the number of deployed strategic nuclear weapons). However, it cannot count on New START or any future nuclear arms control agreement being in effect in the next few years, let alone in 2035, and should plan to prevent nuclear war in an environment without any legally binding or verifiable numerical limits.

Therefore, the United States must reconsider arms control with a broader focus on avoiding a nuclear war, rather than a narrow focus on nuclear weapons. The P5 restated the Reagan-Gorbachev statement that “a nuclear war cannot be won and must never be fought.”¹⁸¹ Recalibrating and expanding the scope of risk reduction should consider cross-domain arms control. Such an approach could include as examples: (1) constraining missile defenses that the United States would not pursue in exchange for constraints on Russia’s novel nuclear weapons; (2) defending priority critical infrastructure; (3) constraining the number or location of certain conventional capabilities in exchange for nuclear weapons constraints; and (4) pursuing dialog on understanding the implications and dangers of AI for NC3 systems.

Increased investment in new commercial and innovative technologies, such as crypto and blockchain technology, that could be applied to verification should also be prioritized.

Conclusion

In conclusion, new threats are rapidly materializing, including the risk of rapid escalation to nuclear war, requiring that the United States adapt and evolve deterrence strategy and modernization requirements. Making changes on the margins of twentieth-century deterrence architecture, including adding more nuclear missiles, especially lower-yield weapons, will not make the United States safer and could exacerbate the risks of a nuclear arms race and lower the threshold for nuclear weapons use. The United States must expand its focus from a narrow emphasis on nuclear strategy and nuclear weapons to take advantage of new tools and U.S. innovation as part of its modernization plans. The United States urgently needs more resilient and agile architectures and platforms for deterrence stability and more agile acquisition processes that leverage private sector innovation. As the land of SpaceX and Google, the United States’ competitive edge must enhance strategic deterrence and prevent the risk of nuclear war in a two-peer environment.

The Challenges of Deterrence, Reassurance, and Stability in a World of Growing Nuclear Competition

By Jon Wolfsthal

The future challenge of managing the risks inherent in the existence and possession of nuclear weapons and in competition among multiple nuclear armed states will be more complicated than those of the recent past. In many ways, these risks will be more difficult to manage than those faced during the Cold War. Having not one but two nuclear peer competitors, along with a host of smaller nuclear possessor states, will pose new burdens and dangers for the United States and its allies. Yet, despite these risks, the basic concept for how one may use nuclear weapons to deter aggression (nuclear and otherwise) against the United States and its allies has not changed. To deter, one needs to be able to deny an adversary the thing they hope to gain through aggression or punish them so that the gains of an aggression are outweighed by the cost. Deterring means knowing what your adversary values, holding those things at risk, and making clear your ability and willingness to follow through on those threats. This was true even before nuclear weapons were invented.

Even sound deterrence policy comes with grave risks. Deterrence can fail—and can do so with global consequences. Thus, there is an inherent risk to over-relying on nuclear weapons for deterrence. Aside from the prospects that a country just gets it wrong or miscalculates, or a leader proves incapable of handling a crisis with rational precision, arms races are costly and pose significant risks through both escalation and misunderstandings. One country's rational nuclear strategy can look highly threatening and destabilizing to another. Arms racing and instability also bring a greater pace of nuclear operations, which in turn increases the risk of nuclear accidents that can have unimaginable consequences. And managing relationships in a time of tension when nuclear weapons are a feature of state competition is inherently unpredictable. Every clash of forces has a nuclear tint and every confrontation can become a nuclear test of wills. Thus, the United States has a strong incentive as a status-quo power to avoid constructs that rely on matching both Russian and

Chinese nuclear capabilities at the same time as a recipe for stable deterrence. It does not appear strategically necessary, nor does it offer anything in terms of stability or broader security.

Put simply, ensuring credible deterrence of both Russia and China does not appear to require holding all Russian or Chinese nuclear weapons at risk simultaneously. Doing so may be useful for other purposes, such as nuclear war fighting, damage limitation, or alliance management (in some but not all cases). But unless there is evidence that Russia or China values its nuclear weapons more than other assets (such as regime survival, economic centers, and broader elements of state control), then holding Moscow and Beijing's nuclear weapons at risk one for one is not needed for effective deterrence.

While the need to match both states at once is in question, there is little doubt that U.S. allies will be looking to Washington for enhanced reassurances about the United States' ability and commitment to protect them in this new, more complex environment. U.S. nuclear weapons and pledges to rely on nuclear use in the face of extreme threats will likely be part of any U.S. strategy. However, relying predominantly on additional U.S. nuclear capabilities to do so—either in increased numbers or type—will likely prove ineffective. Nuclear weapons reassurance has limits, especially when the main concern about the United States is focused on its willingness to provide defense, not its ability to do so. Put simply, a credibility problem cannot be solved only with capabilities. Thus, for both nuclear deterrence and reassurance purposes, investments in current and projected U.S. nuclear forces over the next few decades appear analytically sufficient, if not excessive.¹⁸²

Alliance management, including credible extended deterrence, has always relied on much more than nuclear weapons, or military forces overall. Deterrence is about both capabilities and commitment to act in the face of threats. The possible rise of a new near-peer competitor in China, combined with the continued dangers posed by a revanchist Russia, will demand more (politically and financially) from U.S. reassurance and alliance management strategy. If U.S. alliances are to continue to benefit both allied and U.S. security, the United States will need to do more to enhance its military and its non-military means of reassuring Washington's allies of its willingness and capability to defend them. On the military side, these goals will require greater investments in conventional and non-conventional military capabilities—including cyber, space, intelligence, and command, control, and communications (C3)—and could create additional cost constraints on the U.S. defense budget, which is already rapidly approaching \$1 trillion per year. And nuclear weapons will continue to be an important component in these efforts. However, it would be ineffective and counterproductive for the United States to rely predominantly on nuclear capabilities to address the requirements for extended deterrence, or indeed to depend solely on its military strength for allied management. The reality is that the United States relies more on its allies today than ever before for its economic, technical, political, and cultural strength. The United States and its allies have never been more reliant on each other, and the loss of any one major U.S. ally could irreparably damage the safety, security, and prosperity of the American people. This reality—U.S.-allied interdependence—should be a key part of U.S. alliance management strategy, especially for states who worry that the United States might abandon them in a crisis.

Lastly, the United States continues to have a strong continued incentive to reduce the role nuclear weapons play globally, to impose costs on states who seek to use their nuclear weapons for coercion or blackmail, and to prevent nuclear proliferation to both U.S. adversaries and allies. The growing emphasis on “responsible nuclear behavior” by the United States is a continued recognition of this reality. Both for hard self-interest and for the ways pursuing a less nuclear world can enhance allied cohesion and cooperation and U.S. global leadership, continuing to champion the vision of disarmament and the near-term effort to prevent proliferation will continue to pay benefits for U.S. and allied security. That such efforts appear harder to

achieve now than in the past should not, in itself, undermine the support for these important objectives.

The United States and its allies will continue to face military threats in the coming decades, and thus will rely on military means for defense and deterrence. For the foreseeable future, it is also clear that the country will rely on nuclear weapons as the ultimate guarantor of U.S. security and of its extended deterrent commitments. But longer-term security will require far more than maintaining certain nuclear capabilities, and nuclear weapons may not be very well suited in scenarios where U.S. allies are uncertain, and U.S. adversaries undermine U.S. interests. For example, if and when the United States loses its conventional superiority in East Asia, the threat to use nuclear weapons to respond to nonnuclear scenarios may be seen as less credible to both adversaries and allies alike, regardless of how many nuclear weapons the United States possesses. Threats to escalate to the nuclear level against a nuclear armed opponent are harder to make credible. Thus, to enhance security, the United States and its allies and partners should sustain a broader set of military, economic, political, and diplomatic capabilities to ensure it retains the ability to deter adversary decision making and reassure partners in a variety of scenarios. At the same time, U.S. strategy should also remember that nuclear weapons can also work against U.S. and allied interests, and that proliferation can threaten U.S. military and technological superiority in a number of ways. One need look no further than the way Russia has used nuclear threats to deter greater U.S. involvement in Ukraine to see that deterrence and coercion can work against U.S. and allied interests. As such, there remains a strong interest for the United States to reduce the global role played by nuclear weapons and to continue to slow or reverse their vertical and horizontal spread.

Thus, the needs of deterrence and nuclear reassurance need to be balanced against the risk that nuclear overreliance can create risks of escalation, pre-emption, crisis instability, and arms race instability. Nothing is cost-free. In addition, the extent to which the United States emphasizes its nuclear commitments to allies could further enhance domestic demands for independent nuclear capabilities if and when U.S. commitments are seen as being less credible. To the extent that these tools of nuclear reassurance further normalize nuclear reliance, U.S. efforts to reassure could erode norms against proliferation and nuclear possession.

There are some who discount or reject the serious risks that come with reliance on nuclear deterrence. This stance belies the imperial evidence of near-misses, accidents, averted escalation, and the ever-present risk of miscalculation. These dangers were constant features of the Cold War, and historical research indicates that Soviet fear of U.S. superiority and aggression was a more dominant factor in the Soviet Union's nuclear procurement than ambitions of territorial aggression.¹⁸³ Thus, it remains important for the United States to continue to evaluate the missions assigned to nuclear weapons and consider reducing or replacing them with more credible and effective capabilities where practicable.

Background

The United States maintains nuclear weapons to deter nuclear and other attacks on the United States and its friends and allies around the world. Should deterrence fail, the president has directed the U.S. military to be able to employ nuclear weapons in order to achieve certain outcomes. These deterrence goals can be broken down into three main components: core nuclear deterrence (deterring nuclear use against the United States), extended nuclear deterrence (deterring nuclear use against U.S. allies and partners), and what this paper refers to as “expanded” nuclear deterrence (deterring nonnuclear attacks against the United States and its allies and partners). Core deterrence—deterring nuclear attacks on the United States and its allies—is a widely accepted mission for nuclear weapons and has received sustained political and policy support in the

United States. It has been highly credible for decades and mostly stable. Extended nuclear deterrence is also a long-standing and sustained U.S. policy and forms a key part of U.S. alliance commitments. Even so, there have always been questions about the credibility of these commitments. Pledging to risk yourself for another state is not a common act in geopolitical affairs. Yet extended deterrence is widely credited as having reduced, but not eliminated, the demand for independent nuclear capabilities among U.S. allies, a key benefit of U.S. alliance efforts over decades. A more nuclear world is a less stable one for all, especially the United States. The credibility of these extended deterrence commitments is a function of both U.S. capability and projected intent to follow through on pledges and legal obligations to protect allies. There are times when capability has been in doubt, just as there are times when intent has been seen as less dependable.

The definition of expanded nuclear deterrence has changed over time but has predominantly focused on use of nuclear weapons to respond to large-scale conventional attacks (or other attacks) that threaten the existence of the United States or its allies that cannot be deterred or defeated solely through conventional and other means. The relative emphasis on this aspect of U.S. policy has ebbed and flowed over time and remains the subject of debate both among allies and inside U.S. policy circles. During the 1950s and 1960s, extended deterrence led the United States to deploy a wide variety of nuclear weapons in Europe and develop a nuclear ladder of escalation due to the perceived conventional inferiority to Soviet and Warsaw Pact forces. The end of the Cold War and the collapse of both the Warsaw Pact and the Soviet Union saw Presidents George H.W. Bush and Bill Clinton withdraw and destroy most U.S. forward-deployed nuclear weapons from around the world. As the perceived threat has changed, U.S. capabilities and deployment strategy have also changed.

Since the end of the Cold War, the United States has relied less on nuclear weapons, both because it has not needed to do so and because it recognized that doing so would increase the demand for nuclear weapons by some states, as well as their incentive to use weapons early. The threat to use nuclear weapons first has been less credible because it has been less necessary. But even when the perceived need was higher, there have always been questions about the willingness of a U.S. president to use nuclear weapons first (or at all) against a nuclear adversary to protect U.S. allies. The United States has never had to prove that it would trade Boston for Berlin, but there has never been an instance where U.S., European, and adversary leaders all believed the United States would take such a step with absolute certainty. For the most part, U.S. decisionmakers have preferred to leave these questions unanswered and have taken the lack of an attack against U.S. allies as evidence—in the absence of conclusive proof—that these threats are effective. That the threat was even remotely credible was seen as enough to justify its continuation.

While nuclear weapons clearly influence adversary and allied behavior, there has been an overconfidence in the role deterrent commitments have had over time and overreliance on nuclear weapons—particularly in the role of expanded nuclear deterrence—can be detrimental to U.S. security. It is understandable that the United States might seek to rely on nuclear weapons to counter larger conventional threats if it has no alternatives, yet doing so is less credible than conventional countermeasures and raises questions about credibility that can never be satisfied. And over time, U.S. reliance on nuclear weapons informs decisions by other states to increase their own nuclear and conventional military capabilities. It seems at least likely, if not probable, that China's long-delayed decision to seek nuclear parity with the United States is driven by a desire to no longer be potentially vulnerable to coercion from expanded nuclear deterrence by Washington. The United States is already in an action-reaction cycle with China, just as it has been with Russia for decades. Ignoring this reality will make it much harder to find stable outcomes.

Bilateral Deterrence vs. the “Three-Body Problem”

U.S. nuclear forces will remain directly relevant to preventing nuclear attack by Russia, China, and North Korea. Understanding the nature of each adversary, identifying how they are likely to act in various situations, and being able to maintain the key tenets of deterrence through denial or punishment remain key parts of any U.S. nuclear strategy toward these states.

However, due to the fallible nature of deterrence (it works until it fails) and the humanity-changing consequences of any future nuclear use, the United States should remain committed to and enhance its efforts to engage Russia, China, and North Korea to reduce the number of nuclear weapons all states possess as it works toward broader multilateral efforts to eliminate all nuclear weapons under effective verification. Nothing suggests this process will be easy or quick, but neither are the demands of deterrence and defense. But nuclear deterrence is an unstable and ultimately unreliable means to an end—security—and should not be seen as a means unto itself. Alternatives to permanent nuclear constructs must be part of a balanced approach to stability and security.

To date, U.S. nuclear strategy has focused predominately on deterring nuclear use by the Soviet Union, and later the Russian Federation. The focus on Russia was due to the global competition between these two states, Russia’s ability to threaten U.S. allies and trading partners, and the comparative size of their nuclear and other military capabilities. This size factor should not be discounted; in a world where the Soviet Union’s leaders viewed their nuclear-peer status as a key part of their global position, holding Soviet nuclear forces at risk developed into a key feature of deterrence. (They cared about them, so the United States held them at risk.)

Over time, deterrence efforts have expanded to include possible threats from China and more recently North Korea. However, due to the mismatch in defense, and particularly nuclear capabilities, between these states and the United States, successive U.S. presidents and their military and civilian advisers have agreed that the nuclear and conventional capabilities needed to address the potential threat from Moscow has been adequate to handle any realistic contingency from Beijing or Pyongyang. Also, while it is clear that North Korea’s leaders view their nuclear forces as keys to survival and power, nuclear weapons have not been seen as central to Chinese leaders’ status or control. The growth of China’s conventional and nuclear capabilities demands that the United States constantly reassess these conclusions, which could lead to new requirements. North Korea, even with its growing nuclear forces, will not be in a position to challenge the United States conventionally, so it poses a different kind of deterrent challenge beyond the scope of this paper.

CHINA

There is mounting concern over China’s growing conventional and nuclear capabilities and its more assertive behavior in East Asia. It appears (and China’s lack of direct engagement and discussion leaves some motives to guesswork) that China has determined that possessing a larger nuclear force, perhaps even similar in size and composition to that of Russia or the United States, is required to assert a position of global power and influence. The growth in China’s forces has led some U.S. strategists to worry that the United States must increase its nuclear forces to maintain effective deterrence of Beijing and reassure nervous allies.¹⁸⁴ However, the fundamental requirements for deterrence—the ability to hold what Chinese leaders value at risk or deny them the thing they may seek to achieve through means of force—do not change just because China has more nuclear weapons, unless, of course, the United States determines that nuclear weapons are what China values most and that each weapon must be held at risk to make deterrence credible¹⁸⁵. There are strong reasons to doubt that this is the case. Thus, it cannot be assumed that the United States will need to significantly alter its nuclear force structure to maintain effective nuclear and extended deterrence vis-à-vis China in the coming

decade or beyond. Enhanced conventional investment to ensure China does not believe it can beat U.S. and allied forces is likely to be an even more relevant factor in stability and deterrence in East Asia. Of course, it should also not be taken for granted that what the United States has today will be enough to deter Chinese aggression in the future. Significant investments in both direct diplomacy and engagement with China are a must, as are greater investments in intelligence and analytic capabilities to understand Chinese thinking, behavior, and decisionmaking.

Why? Because deterrence is not static. Having high confidence in what U.S. adversaries care about and being able to credibly (both in terms of capability and intent) hold them at risk (deterrence by punishment) or deny them those things (deterrence by denial) are basic requirements of deterrence. Before spending hundreds of billions on nuclear weapons that may not add to deterrence, the United States would do better to spend the money needed to hire more Chinese language and military and economic experts who can help understand and interpret Chinese actions and intentions. There is currently a serious shortfall of experienced, trained, and informed analysts on nuclear deterrence, strategy, and stability issues. The community of experts is a fraction of what it was during the Cold War, and greater investments in this area are critically needed. There is and will be a continuing need to reevaluate the credibility of deterrence commitments (nuclear and nonnuclear) and to constantly reassess what adversaries value.

There is also today a tendency in the United States to assume that China will behave in ways similar to the Soviet Union in the Cold War. This forgets that the United States did not correctly assess Soviet actions or intentions then, that the two are very different states, and that the nature of the U.S. relationship with China today is very different from the U.S.-Soviet ties in the 1950s to 1980s. The United States and the Soviet Union had few economic or cultural ties, whereas the United States and China are economically interdependent and millions of Americans claim Chinese ancestry. The United States and the Soviet Union did not have any significant trade or technical interactions, and Europe had very little at all. By comparison, China, the United States, and Europe are all economically and financially interdependent, which increases the levers to influence policy and actions as well as the costs of conflict, competition, and war.

RUSSIA

Deterring Russian nuclear attack against the United States or its allies and partners remains a major U.S. objective, but one the United States understands well and remains highly capable of achieving. Indeed, empirical evidence suggests that Russia remains highly deterred from taking action against the United States and its allies, and especially nuclear action. If one assumes that Russia leaders will remain rational, holding Russian nuclear forces and other means of military and state control at risk, combined with other non-nuclear means of state influence, should continue to be sufficient to deter nuclear attack on the United States and its allies.¹⁸⁶ Moreover, while Russia is likely to value its nuclear forces more in the decades to come, especially now that its conventional forces have proven to be ineffective in Ukraine and elsewhere, it remains far from certain that Putin and Russian leaders value nuclear force above financial or other means of political and state control. As such, nuclear weapons will remain a part of but by no means the most important or most dominant feature of U.S. deterrence and reassurance strategy.

Reassurance of U.S. allies in Europe in the face of a less stable and predictable Russia—especially one that is less invested in the global financial system and less interdependent with Europe—will remain a major U.S. political and strategic challenge. Since the invasion of Ukraine, however, the United States and the North Atlantic Treaty Organization (NATO) have responded remarkably well, with increased investments in European defense, the strongest U.S. leadership in NATO in a generation, and the enlargement of NATO to include

Finland and soon Sweden, which both represent major additions to the ability of Europe to deter and respond to Russian aggression. These challenges will continue as long as Russia remains a non-status quo state and will require constant attention and political commitments from the United States. In addition, the United States has let much of its nuclear and Russian expertise erode over the past 30 years, and government investment in experts who understand nuclear weapons, stability, risk reduction, and negotiations as well as the Russian language and Russian economic and political factors is sorely needed. The United States' overestimation of Russia's conventional military capabilities, and indeed Putin's flawed decisionmaking in deciding to invade Ukraine, demonstrates that the United States has gaps in its ability to accurately predict what Russia is and what it may do.

RUSSIA-CHINA COLLABORATION?

Deterring one state is hard. Deterring two states at the same time is even harder. But what about two states working in concert? The concern that Russia and China might somehow coordinate their nuclear attacks or threats is gaining attention in the U.S. nuclear community. Simply put, does the potential for collaboration between Moscow and Beijing extend so far that the United States must be prepared to fight two nuclear wars—one against Russia and another against China—at the same time?

There is no indication that the coordination of policy or closer relationship between Russia and China has developed into a full-fledged nuclear alliance. If there were credible and convincing evidence that Russia-China relationship had changed to such a degree that this were likely, then it could lead to a determination that the United States might have to match both Russia and China at the same times as part of a damage limitation or warfighting strategy. It is hard to overstate the global and strategic consequences of such a determination. Moreover, seeking to maintain dual parity with both countries could, in turn, lead Russia and China to each build up individually to restore their own parity with the United States—a cycle that could lead to a global arms race of unparalleled scope. However, as there is as yet no indication that the nature of the relationship between the two states is anywhere close to one that would involve joint nuclear war fighting, or indeed putting one state at risk for the benefit of the other. The relationship, as of today and for the foreseeable future, remains highly transactional. Any suggestions that the Russia-China relationship has evolved to this level requires the highest level of scrutiny both for its consequences but also for how it would go against many hundreds of years of political history between the two states.

In sum, as indicated under President Biden, it would appear that the United States can deter nuclear use by Russia and China without needing to match the combined nuclear forces of each.¹⁸⁷ Of course, a future president might determine that U.S. nuclear forces need to be configured in a way to hold all nuclear forces in both Russia and China at risk at the same time for other reasons. Those needs cannot be discounted, but that would be distinct from any deterrence requirements. The financial and security implications of having to match the nuclear arsenals of both countries at the same time would be significant, and any allied demands or presidential determination along those lines would have to be balanced against the financial and opportunity costs. Options for dealing with such requirements, including reducing reliance on land-based systems, increasing less vulnerable submarine-based nuclear options, and further enhancing nonnuclear options that can replace nuclear missions, would also have to be part of those deliberations. Likewise, to the extent that reassurance of allies is a major driving force in U.S. nuclear requirements, other factors, including economic, geopolitical, technical, and domestic political factors, must also be taken into account. It should be recognized within the nuclear security and deterrence communities that there is a limit to what can be accomplished by seeking to compensate for a lack of confidence in U.S. intent with enhanced nuclear capability.

Reassuring of allies in a world with more than one nuclear peer will clearly be among the more difficult challenges for the United States. As relative U.S. power and influence wanes, the United States' commitments to its allies will come increasingly into question. To address this, the United States must continue to encourage allies to take on a greater portion of conventional deterrence and defense capabilities; improve alliance military integration and economic and diplomatic coordination; maintain unified policies designed to protect territorial integrity and the global rule of law; and develop more nuanced strategies for deterring key dangers without overextending U.S. capabilities. This is a tall order and goes well beyond nuclear strategy. The risk, however, is that in such an environment U.S. policymakers will assign to nuclear weapons more missions to which they are not well suited, enhancing the perceived value and utility of nuclear weapons.

In an era where U.S. assurances are seen more skeptically, there will be temptation for allies to pursue their own nuclear capabilities and for the United States to tolerate or even accept such trends. U.S. policy needs to anticipate this and develop more holistic approaches that discourage and increasingly stigmatize the possible acquisition of nuclear weapons by more states, friends and foes alike. This requires the United States to invest more heavily in developing effective arms control strategies that consider trade-offs between categories of weapons—nuclear and nonnuclear—and set strategic priorities for negotiated agreements. Determining what the United States is trying to do (e.g., increase decision time, reduce the risk of battlefield nuclear use, and enhance crisis stability) and developing the means to verify commitments that can achieve those goals should be far higher priorities than they are today. This should include a willingness of the United States and its allies to more openly consider constraints on Western defense and nuclear capabilities if they can achieve valuable and verified constraints on the part of major adversaries. Just as arms control should not become a means unto itself, nuclear and conventional force modernization should not be an end, but a means to an end—achieving enhanced stability and security. Pursuing military capabilities without an integrated diplomatic and arms control strategy is a recipe for a never-ending arms race and crisis instability.

Force Structure and Modernization

The nuclear triad is a misnomer. The United States currently maintains a nuclear pentad, with five distinct platforms for delivering nuclear weapons: land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), air-launched cruise missiles, air-dropped gravity bombs on strategic bombers, and air-dropped gravity bombs on shorter-range fighter/bomber aircraft. All aspects of this pentad of nuclear delivery platforms are in the process of being replaced with modern versions with life-extended warheads and nuclear explosive packages.¹⁸⁸

This program is more than adequate to ensure the United States has a diverse and survivable nuclear force for core and extended nuclear deterrence for decades to come, assuming there is general consistency—as there has been for decades—in presidential employment guidance. Far more pressing are long overdue investments in nuclear command and control and early warning capabilities and efforts to carry out long-term warhead surveillance and nuclear infrastructure modernization to maintain the United States' nuclear weapons. As long as the United States determines that it needs nuclear weapons for its defense and the defense of others, those weapons need to be safe, secure, and effective. Moreover, great efforts must continue to be made and enhanced to ensure that the United States can communicate with its allies and its adversaries in a crisis as needed and to ensure that nuclear weapons are only used when legally authorized by the commander in chief.

There is little potential in today's political and financial environment to debate the prospects for major changes in U.S. force structure. While adjustments to the forces may be made over time due to operational,

cost, or technical factors (it is unlikely that the current program of record will come in anywhere close to on schedule or at estimated costs), the reality is the United States will likely continue to maintain all five current modes for nuclear employment. Those are more than sufficient to deter and, if necessary, carry out current or prospective U.S. presidential employment guidance. There are no compelling military or strategic rationales for pursuing other modes of employment, with a few exceptions discussed before on modernization. That being said, if there were a political opening to discuss strategic costs and benefits for U.S. force structure, there are strong arguments for the United States to move away from large silo-based ICBM forces, which risk creating escalatory pressures in a conflict, since these are easily targeted by an enemy and risk putting pressure on a U.S. president to use or lose these force in a crisis. Despite arguments from states that host ICBMs, these systems are the least stabilizing and most vulnerable part of the U.S. nuclear force.¹⁸⁹

It remains unclear whether the size of U.S. nuclear forces will need to change as China's force grows. However, the capabilities the United States will need to have to reassure allies in East Asia remains a complex question. There is a strong numerical component to the perception that the United States is capable and prepared to protect U.S. allies in the face of a rising China. This is also the case vis-à-vis Russia. The question of "rough parity" may become more acute if and when China's forces come within range of the United States' deployed arsenal. However, this is not the case now, nor will it be for perhaps the next decade, with China having perhaps 400 total weapons to the United States' 1,500 to 2,000 deployed nuclear weapons and just under 4,000 total weapons.¹⁹⁰ Yet numbers may not resolve this debate. Already there are strong U.S. advocates for a new nuclear-armed sea-launched cruise missile (SLCM-N) in order to reassure allies. The United States retired the previous version of the Tomahawk Land Attack Missile-Nuclear in 2009. While it is understandable that analysts who want to reinforce U.S. alliances and reassure allies would seek a capability-based solution, there is a lack of a compelling military or force-exchange argument for these weapons. This is why the chairman of the Joint Chiefs and the secretary of defense have advised the current administration not to pursue the SLCM-N. Instead, the main case for the SLCM-N rests on the argument that the United States must do something new to demonstrate its commitment to allies and its ability to act quickly in the region in the face of growing Chinese military capabilities.

In the absence of a clear military case for nuclear SCLMs, however, the United States should instead work with allies on a broader range of deterrence and reassurance options—nuclear and nonnuclear—to determine if other forms of reassurance may be equally or more credible than new nuclear weapons without the commensurate costs and risk associated with developing and deploying yet another new nuclear system.¹⁹¹ It is worth noting that U.S. allies will continue to ask for whatever options might be available for the United States, particularly if they do not have to pay for or face the consequences of those procurement decisions. To determine how valuable such systems might be for deterrence, it would be useful for U.S. allies to be asked to invest in the development and procurement of those systems to determine where they actually sit on these countries' lists of defense priorities. There should be little debate that the United States should continue to work to reassure its allies. However, U.S. actors have a responsibility to understand that much of the doubt among U.S. allies comes not from the range of U.S. nuclear or conventional military capabilities, but due to domestic political and geostrategic factors. There would seem to be little the United States can do with a SLCM-N to address those doubts and concerns. For now, the United States seems to have found a mix of interoperability with Japan and enhanced nuclear communication and coordination with South Korea that may provide time for the United States and its allies to find more effective and less nuclear-focused options to enhance reassurance and defense.

Beyond deterrence and reassurance, it remains possible that a future U.S. president may determine that it is important for the United States to hold all Chinese nuclear forces at risk, for either force-exchange or nuclear

war-fighting reasons. The determination of what U.S. nuclear weapons are for and when they might be used is exclusively the president's decision. To prepare for this option, without having to pursue it prematurely, the United States should continue to invest in a flexible and responsive nuclear infrastructure. Investments to date have not been adequate, nor is the defense-industrial capacity in place to quickly and safely ensure the United States can respond to geopolitical developments. Instead, the United States has chosen to prioritize new delivery systems—a balance that risks leaving it with fewer deployed weapons than it might need as well as a less than responsive infrastructure. In short, there is not enough money, people, and capable companies to go around. At the same time, the need to upgrade U.S. nuclear command, control, and communications (C3) systems remains both relevant and pressing. Instead of making nuclear planning decisions on the basis of numbers alone, the United States should adopt a nuclear strategy that ensures the survivability of forces, as well as the responsiveness of people and facilities, and invests needed resources in broader forms (mostly nonnuclear) of defense, deterrence, and reassurance. A wide variety of options for pursuing this exists.¹⁹²

In short, the United States, for now and the foreseeable future, has a nuclear force capable of deterring China and reassuring allies, but over time this may not be true and should be routinely reassessed. The balance that needs to be struck cannot be defined now but should include a healthy dose of skepticism regarding the role that enhanced capabilities (especially nuclear) can provide, instead relying on a more tailored and nuanced set of defense, deterrence, and reassurance strategies.

It also remains important to keep in mind the significant expense associated with nuclear modernization. While a price tag of some \$50 billion a year is small compared with an overall defense budget rapidly approaching \$1 trillion per year, the long-term sustainability of such a program over the next 30 years—especially given the likelihood of cost overruns and project delays—cannot be assumed. There is renewed evidence that, in fact, the cost of U.S. nuclear modernization does compete with other defense priorities and obligations. The pronounced necessity for the United States to provide cluster munitions to Ukraine due to an acute shortage of even basic 155 mm artillery shells shows that U.S. defense investments may need to be dramatically realigned given actual defense conditions globally. The costs of nuclear weapons must also be considered, as voices within the U.S. domestic political scene call increasingly for the government to do less abroad and more at home, calls that stem from both the conservative and progressive sides of the political spectrum. It is just as common to hear unilateralist Republicans call for more fire stations at home as it is to hear similar statements from extremely progressive voices, echoing the old “guns versus butter” debate. Supporters of the nuclear modernization program like to point to what they call a consensus for nuclear modernization, but there remains a real prospect that this “consensus” is fragile, as it exists inside a very narrow band and can change rapidly. Should support for nuclear programs change, three options in particular should be considered:

- 1. Reduce the ICBM buy and consider multiple independent reentry vehicles (MIRVs).** It remains unclear why the United States needs to maintain 450 ICBM silos from a deterrence perspective. The idea that a widely dispersed set of ICBMs complicates targeting by an adversary is not unreasonable, but the distinction between 300 and 450 seems far from critical in this case. Moreover, unlike in the Cold War, it is not credible to be concerned that the difference between 300 and 450 aim points will prove a tipping point for a state in deciding whether or not to launch a pre-emptive nuclear strike.

Moreover, the impetus for moving to single-warhead ICBMs was part of a negotiating process with Russia that sought to reduce its reliance on MIRVed ICBMs. That decision has already been made, and Russia has invested heavily in and is deploying such weapons. While it would be more stabilizing in a crisis for both the United States and Russia to have ICBMs with single reentry vehicles, the importance

of doing so is no longer as relevant as it was in the 1990s when the concept was developed. Thus, the United States should consider the option of deploying fewer ICBMs and equipping some with multiple reentry vehicles. A reasonable option could be 300 ICBMs with some combination of one or two reentry vehicles. This option may prove valuable if ICBM production is affected by challenges such as slipping timelines or cost increases.

2. Invest in mobile ICBMs. If the United States plans to continue to consider its nuclear forces as retaliatory and wants to ensure their ability to survive a first strike, the option of mobility should be considered. If cost is not an issue, then there is all the more reason to consider whether the United States should pursue a mobile ICBM program instead of or as a partial replacement for the planned ICBM modernization program. Systems could be kept in bastions during normal times and scrambled as a signal in times of crisis. Such system could be far more survivable than fixed ICBMs. The cost implications are not insignificant and should be studied. This is also an important issue in the highly unlikely but not fully dismissible case that U.S. ballistic missile submarines (SSBNs) become more vulnerable due to advances in anti-submarine warfare capabilities enhanced by underwater drones and artificial intelligence. Mobility and survivability for U.S. ICBMs would seem to be justified and are worth considering, especially if they could result in a smaller production run for missiles.
3. Consider expanded Columbia-class submarine buys in lieu of ICBM construction. U.S. submarines remain highly survivable and critical elements for deterrence. They are more stabilizing than ICBMs because they are hard to target and do not need to be used early in a conflict. As the U.S. need to reassure allies increases, there may be a greater need to enable port visits for U.S. SSBNs to U.S. allies. In a future where U.S. requirements for deterrence or reassurance increase, building a larger SLBM force—with equal or reduced loading of weapons—may make sense.

Overall, the United States should prioritize, to the extent that such trade-offs prove necessary, its submarine and bomber development programs and stockpile stewardship and surveillance programs over the ICBM modernization effort. ICBMs remain the most vulnerable and arguably the least stabilizing leg of the nuclear force structure, and their reduction and even elimination would not inherently undermine U.S. deterrence goals, depending on broader employment guidance and geopolitical circumstances. There also remain questions about the eventual scope of the B-21 bomber acquisition program. There are hopes that this effort will not replicate the B-2 effort that sought to purchase 100 bombers and ended with only one-fifth of that fleet, but the significant costs of the program suggest that there remain long-term obstacles to the program reaching its full size.

Also, the United States should avoid the tendency to develop nuclear weapons systems solely as part of either an arms control or reassurance strategy. The temptation to develop a SLCM-N in order to provide enhanced assurance to East Asian allies is ineffective, counterproductive, and anachronistic. Dubbed “shiny object reassurance,” the idea that the deterrence credibility of the United States is significantly enhanced if it buys a dedicated nuclear system for the protection of allies lacks evidence and does not withstand serious scrutiny.

As the United States pursues nuclear modernization, it is critical that U.S. nuclear policy and investments not be made in a vacuum or in isolation from other critical components of U.S. military and diplomatic strategy. The Biden administration’s decision to approach the Nuclear Posture Review and National Defense Strategy as a cohesive process was a step in the right direction, but it still drew upon stovepipes within the nuclear process to inform its policies. Instead, a broader frame is needed for future strategic planning. As the United States pursues these strategies, there are certain guidelines that should be followed, including investments in three key areas:

1. Ensure the integrated foundations of deterrence. The key to a stable deterrent dynamic is ensuring the combined capabilities of the United States and its allies conventional and nonnuclear, nonconventional capabilities (e.g., space, cyber, AI, and non-kinetic), and political strategies are sufficient to deny China (and to a lesser extent Russia) the ability to unilaterally undermine the security of U.S. allies and partners without facing significant consequences that put the success of any such attack in doubt.
2. Enhance U.S. intelligence and broader analytical understanding of Russian and Chinese goals, objectives, and priorities to inform both U.S. deterrence and diplomatic strategy. If the goal of U.S. nuclear forces is to, *inter alia*, hold key targets that Russia and China value at risk, then it needs to have high confidence that it knows what those military targets are and the ability to put them at risk through a variety of means. It remains far from certain that either state (especially China) views its strategic nuclear assets as among its most valued targets.
3. Enhance the ability of the United States to use nonnuclear and nonmilitary means to influence Russian and Chinese behavior and actions. There are far more opportunities to influence China, given that it is far more economically integrated into the world system now than the Soviet Union was during the Cold War. These opportunities should be emphasized, and a broader deterrence and influence strategy should be developed to lessen the need to rely on either conventional or nuclear response options.

Extended Deterrence and Assurance

As discussed above, the United States should seek to sustain its core and extended nuclear deterrence commitments and capabilities. Doing so enhances U.S. and allied security and supports broader goals of preventing nuclear proliferation. Core nuclear and extended nuclear deterrence are seen as credible and stabilizing in normal times and as long as broader deterrence holds.

The effort to use nuclear weapons to deter nonnuclear threats by nuclear-armed states, however, especially against allies, is seen by many as less credible and creates certain risks, including what is widely known as a commitment trap.¹⁹³ By saying that the United States might be willing to use nuclear weapons in certain scenarios, the pressure to follow through on those pledges if those circumstances come to pass is significant. The long-standing debate over the value of trying to deter nonnuclear threats through the use of nuclear weapons is unlikely to be resolved anytime soon. While it remains possible that a stated willingness to use nuclear weapons first in certain nonnuclear scenarios may influence a nuclear-armed adversary's course of action, U.S. policies that include options for first use can also make it more politically acceptable for U.S. adversaries to do the same (see Russian threats and justifications as one example). It is hard to determine the net effect of first-use options by the United States, but it would seem useful to consider not only whether ambiguity or possible first-use options might contribute to deterrence but also look at broader secondary and follow-on effects and how they impact U.S. security objectives. And as discussed above, determining on balance if the costs of such commitments are worth the benefits relies on subjective analysis. There is no question that allies want the United States to be ready and to project a willingness to use nuclear weapons early in a crisis. The maintenance of first-use options is driven mainly by a strong set of allied views that the adoption of more restrictive declaratory policies would undermine the goal of deterrence. Allied views on such issues were formed largely during the Cold War, based mainly on a logic that nuclear use would ensure the conflict is between the United States and its opponent and not fought only on allied territory. This logic still holds for many supporters of the status quo. That desire needs to be balanced against the very real evidence that being willing to resort to early and first use may have negative implications for crisis stability and arms racing, especially when combined with missile defenses and other strategic nonnuclear capabilities. Just as

allied views need to be taken into account for many security issues, they should not be seen as absolute, as in the case of the decision to provide cluster munitions to Ukraine.

What is clear is that there is no one-size-fits-all policy for providing assurances to allies and partners. Just as the United States has pursued tailored deterrence with regards to its adversaries, it must pursue tailored and expanded reassurance with regards to its allies, and this must include more than just nuclear or military components. An enhanced set of reassurance initiatives that focus on economic, political, technical, cultural, people-to-people, and other ties is critical to reinforcing extended reassurance in the coming decades. Moreover, in the defense and security spaces, it is clear that what works in Japan, as evidenced by their newly adopted defense policy and expanded conventional, intelligence, surveillance, and reconnaissance (ISR), and space investments, may not be as effective in South Korea, and vice versa.

Given the trajectory of Russian, Chinese, and North Korean nuclear and other defense capabilities, the United States should be guided by three main objectives in managing its alliance relationships:

1. Strengthen the credibility of core and extended nuclear deterrence;
2. Enhance nonnuclear defense and deterrence capabilities through greater investments, integration, and cooperation with and among allies (U.S.-Japan defense planning offer an attractive model); and
3. Reduce, to the extent possible, the role of nuclear weapons in deterring nonnuclear threats and reinforce the barriers to acquisition of nuclear weapons or nuclear latency by allies.

This last point remains critical. With a few exceptions in the 1950s and 1960s, the United States has remained committed to a basic axiom that the consequences of more countries acquiring nuclear weapons are negative for U.S. and global security and stability. Proliferation increases the risk of nuclear use, theft, and broader proliferation. All of these make it harder to maintain U.S. power and influence and the stability that has brought with it unparalleled American prosperity. The temptation to accept the acquisition of nuclear weapons by U.S. friends and allies is a siren song that should be resisted at all costs.

It is appropriate for arms control to be considered in the context of broader deterrence and allied management policy. NATO itself has integrated deterrence and arms control as integral components of security for the alliance. The same concept holds true for U.S. allies in East Asia, as well as for U.S. security on its own.

Arms Control

It is commonly stated today that arms control is either a policy of the past or that arms control is not possible without willing partners. Rumors of arms control's demise remain premature, but it is accurate that effective arms control agreements are not possible without willing partners. That does not mean the work of thinking about, planning for, and pursuing arms control begins only when another country decides it is ready to talk. The United States continues to have a strategic incentive to develop and pursue policies that reduce the role of nuclear weapons in ways that enhance U.S. and allied security, predictability, and stability. Being committed to nuclear engagement and arms control shows the rest of the world, and importantly U.S. allies, that it is taking a balanced approach to security and threat management. Support for arms control has been and remains a valuable component of alliance management strategy. While defense procurements and deployments, as well as changes in policy, can influence alliance management and deterrent policies, arms control strategies and approaches can as well, including ones that help shape the strategic political and diplomatic landscape. By demonstrating over and over that the United States is the one interested in pursuing practical and serious

arms control efforts to reduce nuclear risks and pursue reductions, it can either convince Russia and China to engage or demonstrate that it is Moscow and Beijing, not Washington, that is the obstacle to progress. Both goals are in the U.S. and allied interest. This approach is also a key component in demonstrating what the United States now calls “responsible nuclear behavior,” with important implications for its global diplomatic strategy.

The United States must remain active in developing bilateral and multilateral strategies for how arms control can enhance U.S. and allied security, alliance management, and deterrence. This includes doing complicated analysis on what adjustments the United States and its allies would be prepared to make in order to find agreement with Russia or China, for example, on changes to their military capabilities. Knowing what the United States would want Russia and China do to, and for what purpose as part of constraint agreements, is a key component, currently lacking from U.S. strategy. This was the type of net assessment that was inherent in the negotiation and adoption of the U.S.-Soviet Anti-Ballistic Missile, Strategic Arms Limitations Talks/Treaty (SALT) I, and Intermediate-Range Nuclear Forces agreements.

In order to develop and shape the diplomatic landscape for future arms control with Russia and China, the United States and its allies should:

1. seek concepts that make nuclear weapons use less likely and less acceptable;
2. enhance decision times for leaders on all aides;
3. find ways to reduce the possible incentives for states to use nuclear weapons easily in a crisis or under threat of nuclear attack;
4. create predictability in nuclear force structure changes that can reduce the pressure to pursue worst-case planning on all sides;
5. ensure that arms control and reduction requirements are factored into procurement and modernization decisions (contract adjustments that include opt-outs for procurement by the Department of Defense and National Nuclear Security Administration);
6. do not pursue modernization to enhance arms control prospects. Be prepared to adjust modernization efforts as part of negotiated agreements or new arrangements if possible, and develop and pursue proposals for them before modernization programs come to an end; and
7. pursue broader public diplomacy efforts to demonstrate that the United States is seeking stability and security through arms control as well as defense and modernization efforts.

Based on current trends, it will be exceedingly hard for the United States to negotiate and adopt legally binding agreements with Russia that limit the size of each country’s strategic nuclear forces for several years. Likewise, China’s refusal to engage in direct strategic stability discussions with the United States suggests that any such efforts with Beijing will take longer to achieve. It may be possible that China will refuse any such engagement until its modernization efforts reach a level that gives Beijing confidence that it is able to maintain a fully survivable retaliatory capability that can withstand U.S. attack and U.S. and allies middle defense efforts.

In this environment, the United States and its allies should pursue two strategies. The first is to be prepared to pursue arms control negotiations and reductions with either or both states if and when possible. This means investing in the people, technologies, and analysis to support rapid restart of arms control if and when geostrategic circumstances allow. The United States was not properly organized and prepared in the 1980s and

1990s when negotiating opportunities presented themselves, and any potential future capability gaps should be avoided. National and regional circumstances can change without warning, and the United States needs to be prepared to respond quickly on complicated diplomatic issues in the same way it seeks the ability to be able to respond to unpredictable military developments. The United States should be prepared to lead in these efforts and, even if not convinced that U.S. and allied adversaries will follow suit, should consider steps that do not significantly compromise U.S. and allied security in order to create global political and other pressure on adversaries in other ways. A prime example is the issue of transparency, where the United States can continue to demonstrate its commitment to predictability by sharing the size and general disposition of its nuclear forces and contrast its behavior with that of China and Russia, who refuse even the most basic steps toward predictability and transparency. Other steps, such as the anti-satellite direct ascent policy, offer examples where the United States loses little but can use the moral and political upper hand to contrast behavior among nuclear states.

The development of serious, strategic, and viable arms control initiatives requires a whole-of-government effort within the United States. However, the knowledge and skill sets needed to develop, assess, and pursue such programs are in short supply. The retirement of an entire generation of U.S. experts and officials who pursued and implemented arms control in the late twentieth-century means that the U.S. government and security community lack the necessary skills and experience to effectively pursue constructive arms control. Likewise, the political space to consider or even propose legal agreements to enhance U.S. security with Russia and China is hard to find. The political environment for restraint has always been hard, but the domestic political landscape has made it—and indeed many things that could benefit U.S. security—harder to pursue. The political will to pursue a balanced approach to security will clearly involve defense and deterrent investments, but the United States should also make investments in the ability to understand Russian and Chinese thinking and strategy, develop effective verification approaches, and pursue coordinated diplomatic strategies to achieve effective outcomes, whether normative, legal, or otherwise.

At a time when the United States is spending \$50 billion per year on nuclear weapons alone, not including associated strategic programs, the investment in the future people, skills, technology, and analytical capacity needed in the sphere is unfathomably small. This mismatch will create a self-fulfilling policy outcome, where every problem has a nuclear solution but the ability to pursue offramps to arms race instability and de-escalation approaches has disappeared or largely atrophied. Likewise, the need for a robust civil society and academic and policy community outside government to inform, drive, and, when appropriate, support U.S. government efforts is also acute. A shortage of investment and career opportunities within the broader nuclear security and arms control field will deprive the U.S. government of a historical source of thinking and analysis on these important issues. Investments from both government and private foundations are needed to address these shortfalls.

Conclusion

The world faces a complex and extended period of global competition where the demands of managing nuclear risk will continue to grow. Understanding the limits of U.S. nuclear capabilities in both deterring adversaries and reassuring allies is a key part of getting this critical issue right. There are things the U.S. nuclear arsenal can do and some things it cannot, and nothing (just as in life) is cost-free. The balance—between (1) using U.S. nuclear weapons to deter and reassure while (2) seeking a change in global strategic conditions to permit a broader effort to curb proliferation and pursue nuclear restraint, reductions, and eventually elimination—needs to be kept in mind as the United States and its friends, allies, and partners

navigate this complex era. Nuclear skepticism is needed to balance faith in nuclear deterrence. Investments in non-nuclear and even non-military approaches to both reassurance and deterrence, as well as serious efforts to reinvigorate arms control, will be as important as investments in new nuclear weapons and their associated delivery systems. A failure to pursue all of these approaches together will lead to negative outcomes for U.S. security and global stability.

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