



Unarmed Air Force Minuteman III intercontinental ballistic missile launches during operational test, May 3, 2017, at Vandenberg Air Force Base, California (U.S. Air Force/Daniel Brosam)

Don't Get Lost in the Numbers

An Analytic Framework for Nuclear Force Requirements Debates

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The international strategic landscape is rapidly evolving. Shifting balances of power, galloping technological change, and emboldened opposition to the rules-based interna-

tional order pose discrete challenges to U.S. national security and that of its allies and partners. The most consequential shift may be the pace with which the People's Republic of China

(PRC), the Russian Federation, and the Democratic People's Republic of Korea (DPRK or North Korea) are expanding and diversifying their strategic capabilities, each increasing its reliance on nuclear weapons to achieve national objectives. When viewed in their totality, such changes constitute a generational challenge for which the United States must develop a prevailing national strategy.

Nuclear weapons and their unique deterrent effects have long been the cornerstone of U.S. national security and a steadfast pillar of international stability. The United States has, for decades, sought to maintain a safe, secure, and effective nuclear force.¹ As U.S. competitors, principally China and Russia, modernize their nuclear weapons complexes and field advanced nonnuclear strategic capabilities, U.S. leaders recognize that “deterrence now demands far more coordination, innovation, and cooperation from us all.”² In such an environment, the United States must continue reassessing the role and effectiveness of nuclear forces in safeguarding America's vital interests—in part by implementing “integrated deterrence” as outlined in the U.S. National Defense Strategy.³

Some analysts may observe China, Russia, and North Korea augmenting their nuclear arsenals and missile capabilities and justifiably conclude that the United States needs to increase the size of its own nuclear stockpile. While the balance of nuclear forces is a key input into deterrence calculations, emergent geostrategic risks are not just nuclear. Strategic deterrence involves confidence in being able to cover targets and execute deliberate nuclear plans, but a larger set of considerations necessarily affect the probability of U.S. deterrence success or failure. A prescient and responsive U.S. strategy cannot focus solely on the quantity of nuclear weapons because some potential threats cannot be credibly deterred by simply having more nuclear weapons. To be clear, debates surrounding nuclear force sizing are necessary—but nuclear weapons alone may not solve 21st-century deterrence challenges.⁴

This article proposes an approach to nuclear force sizing debates based on a framework built on four analytic dimensions: overarching risk management approaches; deterrence and assurance objectives; strategic force employment guidance; and operational constraints. The answers to key questions across these dimensions provide a structure to inform debates about the appropriate size and characteristics of U.S. nuclear forces. Only after clarifying U.S. objectives across these dimensions and focusing on key considerations therein should policy-makers enter nuclear force sizing debates. The resulting analysis does not advocate for any policy position or hypothesize the “correct” number of nuclear forces. Instead, the purpose of the framework is to focus nuclear force sizing debates on more fundamental assumptions regarding the role of nuclear weapons in achieving U.S. national security objectives.

Strategic Environment

The PRC, under the leadership of General Secretary Xi Jinping, is accelerating its military modernization programs, with many anticipating dramatic changes to Beijing's nuclear force composition.⁵ The U.S. Department of Defense (DOD) estimates that “the PRC's operational nuclear warheads stockpile has surpassed 400” and “will likely field a stockpile of about 1,500 warheads by its 2035 timeline,” if current trends continue.⁶ Meanwhile, Russia is completing a decades-long nuclear modernization program and continuing to invest in a growing arsenal of more than non-treaty-accountable (colloquially referred to as nonstrategic, or tactical) nuclear weapons.⁷ The DPRK has also made “significant advances over the past two decades in developing a nuclear weapons arsenal,” with some estimating that Pyongyang has sufficient fissile material to build 45 to 55 nuclear weapons, with 20 to 30 potentially assembled.⁸

The PRC, Russia, and the DPRK are also raising the salience of nuclear weapons in their military strategies “to secure coercive and military advantage against the United States, and its allies,

and partners.”⁹ Beijing has engaged in assertive behavior in the Taiwan Strait and the Indo-Pacific region, Russia's Vladimir Putin has heightened nuclear risks in his attempts to dissuade continued Western support for Ukraine, and Kim Jong Un oversaw the passing of a new law that expands the conditions under which North Korea would use nuclear weapons.¹⁰

Numbers Debates

Some analysts contend that if the most consequential potential U.S. adversaries are developing more nuclear weapons, so should the United States. Such arguments are not without basis. The 2010 New START Treaty limits U.S. nuclear forces to 1,550 deployed strategic nuclear weapons and 800 deployed and nondeployed delivery vehicles. The world has changed significantly in the past 14 years, and the risks to deterrence have unambiguously grown. Others may look to the Treaty on the Prohibition of Nuclear Weapons—which currently has 92 signatories—and Russia's nuclear intimations in Ukraine to argue that the world needs to *decrease* the number of deployed nuclear weapons.

Numbers of nuclear weapons can inform and shape strategy, but no matter the frame of reference, seeking more or fewer nuclear weapons is not a strategy in and of itself. It is a desired endstate. If every challenge could be overcome through strategic nuclear deterrence, a simple answer of adding more nuclear weapons to the deployed U.S. stockpile would be an obvious solution. But there are many risks that nuclear weapons alone cannot overcome and many considerations that go into determining which force postures and employment guidelines are achievable. This is not to argue that other capabilities, either military or nonmilitary, can replace the unique deterrent effects of nuclear weapons. Rather, as U.S. national guidance has focused leaders on a strategy of integrated deterrence, it is imperative to understand where and how other capabilities can support the U.S. nuclear enterprise in deterring strategic attacks against the United States, its allies, and its partners.

Debating the merits of different nuclear force sizes without clear reflection back to underlying U.S. strategic objectives puts the cart before the horse. Nuclear force sizing debates can distract from much more important discussions about underlying assumptions and beliefs about the role of nuclear weapons in U.S. national security.

Before advocating for nuclear force sizes, analysts should identify the attributes and characteristics of nuclear weapons most relevant to achieving U.S. objectives set by broader national security strategies. The appropriate composition of U.S. nuclear forces must factor in considerations across dimensions of risk management; deterrence and assurance objectives; strategic force employment; and operational constraints. By analysts' following an analytical method, the necessary attributes and characteristics of nuclear forces should become clearer. Such an approach drives strategy debates and not just force sizing debates.

Proposed Framework

The following section proposes a framework to refocus U.S. nuclear policy and strategy debates on key questions across interdependent and interrelated analytic dimensions: risk management; deterrence and assurance objectives; strategic force employment; and operational requirements. *Risk management* refers to the overarching strategy for navigating geopolitical, technological, programmatic, and operational risks. *Deterrence and assurance objectives* help determine the capabilities necessary to prevent strategic attack on the United States and its allies and partners. Based on the profile of risk and the identified objectives, policymakers outline *strategic force employment* guidance for a given challenge. Such guidance and analysis must consider the *operational requirements* of maintaining a particular posture or executing certain plans. Key considerations within each dimension guide discussions to the heart of many assumptions about the required size of the U.S. nuclear arsenal by isolating where and how nuclear weapons are most useful in achieving national security objectives—and where they are not.

The questions outlined below may not—and in some cases should not—be precisely answered in public forums. Policymakers prefer to build in ample decision space for leaders, particularly where nuclear weapons are concerned, and explicit answers to the questions in each dimension could constrain that decision space. If, for example, the United States outlined exactly what it sought to deter, potential adversaries may perceive false comfort in misbehaving under those deterrence thresholds, which could impinge on other national interests.

Risk Management Considerations

Risk management has been a key component of U.S. national strategy and nuclear force sizing debates for more than 30 years. Reframing policy and strategy choices as an exercise in risk management emphasizes the trade space between different possible solutions and requires policymakers to evaluate a broader set of capabilities in pursuit of that solution. Risk management requires leveraging U.S. capabilities across the interagency community and among international allies and partners—one of the primary objectives of integrated deterrence. For example, shaping potential adversaries' perceptions is a key objective of deterrence. If the objective is framed as a nuclear policy choice, proposed solutions may help to adjust the number of deployed nuclear weapons. If, however, the challenge is posed as one of risk management, there is more space to evaluate other means of influence (for example, diplomacy, economic punishments, or incentives). Both approaches may yet result in a similar recommendation, but intentionally framing objectives through a broader risk management lens requires analysts to examine how nuclear weapons fit among other U.S. instruments of power.

The proposed framework focuses on four categories of risk: geopolitical, technological, programmatic, and operational.¹¹ China's nuclear expansion is an example of a realized geopolitical risk. Technological risks include those that

could undermine the effectiveness of U.S. nuclear weapons systems, such as breakthroughs in advanced missile defenses. Programmatic risks refer to potential delays in U.S. nuclear modernization programs. Operational risks encompass delays to force generation, force availability constraints, unanticipated changes to operational requirements, and so forth. Each category of risk has implications for determining the appropriate attributes and characteristics of U.S. nuclear forces.

Geopolitical Risk. Different actors' behaviors shape geopolitical trends and in turn condition the nature of states' interactions, the profile of developing risks, and balances of power around the world—depending on the relative successes or failures of a particular country's goals. Given this, geopolitics shape the strategic landscape and inherently underwrite all dimensions of policy and strategy analysis as well as other risk factors. Emergent risks and potential threats that warrant a deterrence policy derive from the geopolitical environment. The security landscape shapes allies and partners' risk assessments as well the perceived credibility of U.S. commitments. The objectives guiding targeting and strategic force employment guidance are derived from geopolitics. Operational considerations necessarily reflect the geopolitical landscape because it is the environment in which operations must be conducted today and planned to be executed in the future. Key questions include:

- What risks to U.S. national security may materialize from geopolitical change?
- To which of these risks can nuclear weapons policy and strategy be credibly applied?
- For which risks are nuclear weapons insufficient?

By answering these questions, analysts may begin to identify the attributes of a nuclear force necessary to achieve U.S. national security objectives. The last question in particular helps identify areas in which other instruments of power may be more useful than nuclear weapons alone in achieving U.S. objectives.



Air Force B-2 Spirit assigned to 509th Bomb Wing taxis at Joint Base Elmendorf-Richardson, Alaska, July 19, 2023, as part of bomber Agile Combat Employment exercise (U.S. Air Force/Julia Lebens)

Technological Risk. Disruptive technologies have the potential to alter geopolitics in unpredictable ways. Applying advanced technologies—such as artificial intelligence, quantum computing, autonomous vehicles, and entangled digital platforms, among others—to military operations challenges core assumptions about escalation dynamics and system vulnerability. Successive U.S. administrations have sought to capture the cross-domain deterrence challenges of technological change within their national defense strategies, “integrated deterrence” being the latest manifestation. A growing portfolio of novel delivery systems also has important implications for deterring strategic attacks. Such innovations could further complicate an already precarious geopolitical balance by influencing conflict dynamics, gray zone escalation, systems reliability, and war planning. Deploying a nuclear force that can adapt to such technological change should be a

key objective for U.S. policy and strategy. Key questions include:

- What present and future technological trends pose the greatest risks to U.S. national security?
- What role can nuclear weapons have in mitigating such risks? How might changes to U.S. nuclear forces (either in number or posture) affect technological risks?
- What technological risks is the United States willing to accept?

Programmatic Risk. The most important considerations of programmatic risk for nuclear force sizing are those concerning the time schedule for new systems coming online. The United States remains committed to fielding a triad of strategic nuclear capabilities composed of a sea leg (ballistic missile submarines), an air leg (weapons delivered via B-2 and B-52 strategic bombers), and a ground force of intercontinental ballistic missiles

(Minuteman III), complemented by forward-deployable dual-capable aircraft (DCA). The nuclear modernization program covers all three legs of the nuclear triad and DCA capabilities; their supporting nuclear command, control, and communications network; and the underlying industrial base required to meet production demands. Nevertheless, modernization and recapitalization efforts do influence the flexibility of U.S. nuclear forces and the capacity to field more or fewer at any given time. The answers to the following questions highlight ways in which programmatic risks could affect the desired size and posture of U.S. nuclear weapons. Key questions include:

- How might delays in nuclear modernization and recapitalization programs affect currently fielded forces?
- Would adjustments to force size and posture mitigate some of those risks? If so, to what end?



U.S. Air Force 23rd Bomb Squadron B-52H Stratofortress, two German air force Panavia Tornados followed by two German air force Eurofighter Typhoons, and one Belgian air force F-16 Fighting Falcon fly in formation over Germany during Bomber Task Force mission, August 24, 2022 (U.S. Air Force/Michael A. Richmond)

- What are other risks associated with the transition to replacement weapons systems?

Operational Risks. Any change in nuclear policy has implications for operational requirements. These operational considerations (for example, how many personnel are needed for a certain posture) are explored below. Changes to policy and strategy in peacetime or in early stages of crisis necessarily affect force availability and flexibility during times of increasing tensions or conflict. There is a risk of resource (mis)allocation because of

deliberate force structure decisions that could affect nuclear operations. It is therefore important to explore the operational risks associated with changes in nuclear policy long before analysts advocate for such changes. Key questions include:

- What redundancies or reinforcing attributes are necessary in the force to minimize, or distribute the burden of, operational risks?
- How do other mission sets (for example, conventional theater war) affect availability of capabilities to support nuclear operations?

- How does the possibility of unanticipated operational risks affect the necessary characteristics and attributes of the U.S. nuclear force?

Deterrence and Assurance Considerations

Deterrence. Deterring strategic attack remains the cornerstone of U.S. national security. Even in the most benign security environment, the United States would seek to deter strategic attacks against itself and its allies and partners. Not every potential threat, though, is grave enough to justify an explicit U.S. deterrence policy;



deterrence is inherently costly. There are risks associated with carrying out a threatened (or implied) response if deterrence fails. Punishment is not, however, the only means of deterrence. The United States can deter certain behaviors if it can convince the potential actor that it will be denied the benefits of acting in the first place, but that involves investing in means to deny those benefits. Regardless of the means of deterrence, the United States must have sufficient stake in the consequences of a particular behavior to be willing to inherit the risks associated with responding or make the necessary

investments to deny successful manifestation of the behavior in the first place. Determining which risks the United States would have the capability and will to deter is a key component of identifying the desired characteristics and attributes of nuclear forces. Key questions include:

- What actions does the United States seek to deter?
- Which of those actions can nuclear weapons credibly and effectively deter?
- To which potential threats is the application of nuclear deterrence insufficient or noncredible?
- Where and how might a potential adversary perceive a plausible advantage of “breaking” U.S. deterrence?
- Are there certain periods (for example, peacetime, intrawar) where deterrence failure is more likely?

Assurance. Assurance is not only about military capabilities; it also relies as much on policy and strategy. During the early Cold War, for example, U.S. policy relied on threats to initiate general nuclear war against the Soviet Union if Moscow invaded West Germany.¹² While the United States certainly had the capabilities to execute such a mission and the Soviet Union ultimately did not invade West Germany, some U.S. allies questioned “American firmness” on its extended deterrence policy.¹³

Assurance comprises efforts to convince allies and partners that the United States has the capability and will to incur the risks of deterring attacks on their countries. Allies and partners may be more assured if they believe their national security is a U.S. vital interest and that the United States can deter efforts to undermine that interest. Assurance considerations are thus intrinsically bound to core U.S. deterrence objectives. If the United States, its allies and partners, and a potential adversary all perceive U.S. strategy as credible, both deterrence and assurance objectives are satisfied. However, deterrence alone does not suffice for assurance. If only the United States and a potential adversary perceive a U.S. strategy as credible, assurance objectives may not be met even if deterrence is successful. Key questions include:

- Does assurance require nuclear force adjustments beyond those required for deterrence?
- Are allies convinced that potential adversaries perceive U.S. extended deterrence commitments as credible? If not, why not?

Strategic Force Employment

Nuclear weapons force employment guidance is signed by the U.S. President and further refined by the U.S. Secretary of Defense and Joint Chiefs of Staff.¹⁴ Planners then “develop specific military objectives . . . that are designed collectively to achieve specified endstates.”¹⁵ Once identified, objectives guide planners as they develop options to achieve them.¹⁶ Analysts advocating for particular nuclear force sizes must first account for these force employment considerations because “U.S. strategy for nuclear employment informs its force sizing and posture decisions.”¹⁷

Simply put, strategic force employment guidance is driven by strategic and military objectives. Any nuclear force should maintain the capability to achieve those objectives to include directed flexibility in achieving them. Guidance directs some flexibility (that is, providing multiple options to the President), and the force composition enables flexibility (even in cases when it is not directed). Such flexibility can change over time, either due to direction, changes in force composition, or adversary action. Yet nuclear weapons are part of a broader array of strategic capabilities, and therefore other tools may be able to support nuclear force employment in achieving a desired objective. For example, improvements in nonnuclear weapons systems may decrease the number of nuclear weapons necessary to satisfy a particular objective. Whether or not some of these conventional capabilities can be reserved for executing strategic objectives has implications for nuclear force sizing.

Strategic force employment considerations for nuclear force sizing require that analysts focus on objectives identified by higher leadership, evaluate the attributes

and characteristics necessary to achieve those objectives, and assess how other capabilities can support such missions. Key questions include:

- How does the United States prioritize different political and military objectives with the nuclear force?
- How much flexibility (that is, ability to achieve objectives under different conditions and in different ways) is desired in the U.S. nuclear force?
- To what extent can the employment burden be mediated by nonnuclear capacities (that is, are nonnuclear capabilities considered a replacement for or augmentation to nuclear capabilities)?

- What objectives does the United States need to be able to achieve against countries simultaneously (if any)?
- What forces would be required to immediately address escalation?
- What forces would be required to maintain/restore deterrence thereafter?
- What objectives does the President want to achieve?
- What adversaries does the President direct planning against?

Operations

Any desired nuclear posture requires additional forces beyond those deployed

and additional support capacity beyond nuclear weapons themselves. For example, increasing and sustaining the alert level of the bomber force would require an increased number of air crews and tanker availability. Similarly, the United States may need more submarines than are at sea day-to-day because maintenance and upgrade schedules restrict all submarines from always being at sea.

The central question is: What are the operational demands of achieving a particular force posture? More precisely, what are the operational requirements of increasing or decreasing the number of deployed x on y alert status (x



Defender with 5th Bomb Wing guards entry control point during Global Thunder 23, at Barksdale Air Force Base, Louisiana, April 14, 2023 (U.S. Air Force/James Thompson)

representing the nuclear delivery system, y representing desired alert status)? The precise answer to most of these questions is not publicly available, but even outside analysts must consider the operational implications of any desired change in force posture—whether in number or alert status. Key questions include:

- What operational requirements must be met to present the nuclear force as desired?
- What is the desired alert posture of nuclear forces?
- If the force is generated, how long must/can it be operated in that state? How long will it take to regenerate afterward?
- How much of the force needs to be postured in a survivable mode at a given time?
- How much flexibility is needed in how nuclear operations are executed?

Conclusion

Primary U.S. competitors are augmenting their strategic capabilities and magnifying the salience of nuclear weapons in their national strategies. The resulting geopolitical risks are compounded by an unpredictable technological future and internal programmatic and operational risks relating to U.S. strategic forces. Within this context, the United States must continue meeting its deterrence and assurance objectives, retaining the ability to execute strategic force employment guidance, and navigating operational constraints. In devising approaches to such an amorphous strategic environment, analysts must reframe nuclear force sizing debates around fundamental disagreements and assumptions regarding the role of nuclear weapons in achieving U.S. national security objectives.

The proposed framework identifies four analytic dimensions (risk management; deterrence and assurance; strategic force employment; and operations), and key considerations therein, to structure debates about the appropriate attributes and characteristics of the U.S. nuclear force. Risk management approaches accentuate ways in which other instruments

of national power can help mitigate geopolitical, technological, programmatic, and operational risks. Highlighting deterrence and assurance requirements focuses thinking on core objectives for U.S. strategic capabilities. The principles and policies shaping strategic force employment focus on the underlying requirements for nuclear weapons directed by U.S. leaders. Operational considerations require analysts to account for operational constraints of fielding a particular force composition.

Key questions across each dimension reveal important assumptions and differences in beliefs about the necessary attributes and characteristics of U.S. nuclear forces. By highlighting the component parts driving U.S. policy and strategy, analysts can structure conversations about U.S. nuclear forces in a way that maximizes their utility and policy relevance. Using such a framework is critical to ensuring that U.S. leaders understand the full ramifications of any changes to the composition of U.S. nuclear forces without getting lost in numbers debates. **JFQ**

Notes

¹ *The Nuclear Matters Handbook 2020* (Washington, DC: Department of Defense, 2020), 16, <https://www.acq.osd.mil/ncbdp/nm/NMHB2020rev/docs/NMHB2020rev.pdf>.

² “Secretary of Defense Remarks for the U.S. INDOPACOM Change of Command,” *Defense.gov*, April 30, 2021, <https://www.defense.gov/news/Speeches/Speech/Article/2592093/secretary-of-defense-remarks-for-the-us-indopacom-change-of-command/>.

³ *National Security Strategy* (Washington, DC: The White House, October 2022), <https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf>.

⁴ According to the *Report on the Nuclear Employment Strategy of the United States—2020* (Washington, DC: Department of Defense, 2020), “Nuclear weapons alone, no matter how capable, however, cannot have the necessary deterrence and assurance effects without a realistic and credible supporting strategy, tailored to potential adversaries,” 4.

⁵ *Military and Security Developments Involving the People’s Republic of China 2023: Annual Report to Congress* (Washington, DC: Department of Defense, 2023), <https://media.defense.gov/2023/oct/19/2003323409/-1/->

1/1/2023-military-and-security-developments-involving-the-peoples-republic-of-china.pdf.

⁶ *Military and Security Developments Involving the People’s Republic of China 2022: Annual Report to Congress* (Washington, DC: Department of Defense, 2022), <https://www.defense.gov/CMPR/>.

⁷ Hans M. Kristensen, Matt Korda, and Eliana Reynolds, “Russian Nuclear Weapons, 2023,” *Bulletin of the Atomic Scientists* 79, no. 3 (2023), 179–199, <https://doi.org/10.1080/00963402.2023.2202542>.

⁸ Hans M. Kristensen and Matt Korda, “North Korean Nuclear Weapons, 2022,” *Bulletin of the Atomic Scientists* 78, no. 5 (2022), 273–294, <https://doi.org/10.1080/00963402.2022.2109341>.

⁹ *Nuclear Posture Review 2018* (Washington, DC: Department of Defense, 2018), 2, <https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF>.

¹⁰ *U.S.—North Korea Relations*, IF10246 (Washington, DC: Congressional Research Service, April 29, 2020), <https://crsreports.congress.gov/product/pdf/IF/IF10246/14>.

¹¹ While the framework already considers geopolitical dynamics, this dimension is more narrowly focused on incorporating geopolitical change into overarching strategies and policies for risk management. Geopolitical and technological risks are primarily external risks, while operational and programmatic risks depend much more on internal risks stemming from U.S. political and military processes.

¹² National Security Action Memorandum 109, *U.S. Policy on Military Actions in a Berlin Conflict* (Washington, DC: The White House, October 23, 1961), <https://www.jfklibrary.org/asset-viewer/archives/JFKNSF/332/JFKNSF-332-011>.

¹³ “30. Memorandum of Conversation,” January–May 1961: Consideration of the Question of Germany and Berlin (Documents 1–31), in *Foreign Relations of the United States, 1961–1963*, vol. XIV, *Berlin Crisis, 1961–1962* (Washington, DC: Office of the Historian, May 31, 1961), <https://history.state.gov/historical-documents/frus1961-63v14/d30>.

¹⁴ Charles Glaser, Austin Long, and Brian Radzinsky, eds., *Managing U.S. Nuclear Operations in the 21st Century* (Washington, DC: Brookings Institution Press, 2022).

¹⁵ *Ibid.*, 111.

¹⁶ *Ibid.*, 120.

¹⁷ *Report on the Nuclear Employment Strategy of the United States—2020*, 6.