

CLOSING THE GAP: ALIGNING ARMS CONTROL CONCEPTS WITH EMERGING CHALLENGES

BY MICHAEL ALBERTSON

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Table of Contents

About the Author	2
Preface	
Brad Roberts	3
Executive Summary	4
Introduction	6
Exploring Quantitative Symmetries and Asymmetries	11
Understanding Risks and the Concepts of Strategic Stability	26
Recognizing Externalities and Instabilities	36
Applying Metrics to the Evaluation of Arms Control	42
Depth	43
Breadth	44
Durability	46
Complexity	48
Cost	50
Arms Control Mindsets and Mechanisms	52
Conclusion	66

About the Author

Michael Albertson is deputy director of the Center for Global Security Research (CGSR) at Lawrence Livermore National Laboratory. Prior to his current position at CGSR, he served for 16 years in the federal government handling a wide variety of deterrence and arms control-related portfolios for various organizations. From November 2018 to September 2020 he was a senior policy advisor in the Office of the Secretary of Defense (OSD) in the Office of Nuclear and Missile Defense Policy, facilitating extended deterrence dialogues with NATO and Asian allies. Before OSD, Mr. Albertson worked as a team lead in the Department of State's Office of Strategic Stability and Deterrence Affairs from 2015 to 2018 on Russian strategic nuclear arms control issues including implementation and compliance of the INF Treaty and New START Treaties. He served from 2013 to 2014 on the National Security Council Staff as a director for Russia covering Russian military-security issues; from 2010 to 2012 as a policy advisor to the senior advisor for Arms Control and Strategic Stability to the Under Secretary of Defense (Policy) participating in the negotiation, ratification, and implementation of the New START Treaty; and from 2004 to 2010 as an intelligence analyst and then senior intelligence analyst in the Department of Defense studying Russian military capabilities and doctrine. He holds a B.A. in international relations and government from Claremont McKenna College, an M.S. in strategic intelligence from the National Defense Intelligence College, and an M.A. in security policy studies from George Washington University. His most recent publication at CGSR was the Livermore Paper on Global Security *Negotiating with Putin's Russia: Lessons Learned from a Lost Decade of Bilateral Arms Control*.

Preface

Brad Roberts

On what new foundations might arms control of the future be built? Many arms control architects envision new structures assembled atop the existing foundations, on the argument that the foundations are durable and enduring. Thus, for example, they propose next steps on the bilateral U.S.-Russian strategic reductions pathway or a resurrection of regional restraints on nuclear and conventional forces in Europe. The problem with this way of thinking is that the legacy arms control approaches of the Cold War didn't wither away through indifference and neglect; rather, they lost their relevance as new problems and new political circumstances emerged.

This important new Livermore Paper asks a simple question: in the new security environment, what are the new purposes the United States should want arms control to serve? It begins with the observation that "form follows function" and that a great deal more attention has been given to form than function. It continues with an exploration of the main factors that should determine function. These include a broad set of factors derived from the new security environment. The paper then goes on to elaborate metrics by which to assess different approaches. First and foremost, this is a conceptual analysis. It begins with first principles and derives implications. It is a helpful stimulus to the needed new thinking that is much sought but difficult to find.

Executive Summary

An arms control agreement is like a levee built along a major river. It is meant to stabilize and reduce assessed risks at a particular assessed point of danger—an artificial construct designed to channel the flow of strategic competition in certain areas and away from others. The flow of competitive dynamics remains, however, and it may become even stronger in unforeseen places, upstream or downstream, when left unconstrained by an agreement. Sitting in place largely unnoticed, the agreement itself is also subject to constant erosion, the threat of extreme failure, and a need to monitor, repair, and supplement as needed. There is more safety and security with the levee in place, and it may be cheaper to build a levee than deal with the consequences of its absence. The levee never entirely removes the overall risks of the river; in some unforeseen ways, it may even exacerbate other areas along its banks.

If arms control is to survive as a national security tool, it will be necessary to explain its ability and limitations in achieving U.S. deterrence and strategic stability goals in an era of great power competition. These goals are what ultimately should dictate the format of a potential agreement.

To assist in this effort, this paper draws three important conclusions. The first is the need to look beyond simple numbers of launchers and warheads in the next arms control agreement to the challenges of quantitative asymmetries, the erosion of strategic stability, and the pressures of externalities. Deep numerical reductions are unlikely. While limits on launchers could remain and limits on warheads could be imposed, the most important quantitative asymmetry exists in the U.S.-Russian nuclear production complexes. Enhancing strategic stability will be challenging due to the deep-seated mistrust between the two sides. An improvement could be the result, but it should not be the goal. Externalities—the factors outside an agreement—are as important now as they were during the height of the Cold War. If they cannot be directly addressed in the text of an agreement, the agreement must be framed in their terms. The second conclusion is that there needs to be a sea change in the metrics used to

assess the feasibility of future arms control proposals. “What does the U.S. want out of arms control?” is a question left unexplored and unanswered over the last two decades. Instead of how many or how low, the focus should now be on the appropriate balance between factors such as depth, breadth, durability, cost, and complexity. Determining the optimal mix between these factors can improve consensus inside the U.S. interagency and improve prospects for an agreement. The third conclusion is that no arms control format is a silver bullet solution to every problem that exists in bipolar or multipolar competition. All come with positives and negatives regarding the metrics. The best agreement is one where the issues judged to be most important to the United States are addressed using a properly designed arms control tool.

Above all else, this paper highlights that more analysis is needed. U.S. arms control goals remain nebulous. Big questions remain unanswered. What specific problems does the United States want to solve? How does an arms control tool solve it? How much is it willing to spend? What is the contingency plan, beyond mere rhetoric, if arms control disappears? Arms control toolkits need to be explored for these problems. New methodologies such as net assessment should be applied. Much homework remains to be done before formal negotiations begin. The Center for Global Security Research (CGSR) has spent a considerable amount of time over the last five years on the linkages between current and emerging deterrence problems and the future of arms control. The Livermore Papers on Global Security have delved into disarmament, extended deterrence, regional threats, limited nuclear war, non-nuclear capabilities, adversary military strategies, and bilateral arms control negotiations.¹ Similarly, CGSR workshops focused solely on what to do next on arms control, but much more often have focused on the ways in which the deterrence landscape is growing more complex, and consequently how the set of arms control solutions is growing more difficult to conceptualize and negotiate.² Much of the analysis in this paper owes a great deal to these prior publications and workshops, as well as the substantive contributions of the current set of postdoctoral fellows and research associates at CGSR.

1 CGSR publications are available at <https://cgsr.llnl.gov/research>.

2 CGSR workshop summaries and annotated bibliographies can be found at <https://cgsr.llnl.gov/workshops>.

Introduction

The extension of the New START Treaty provided a five-year lease on life for strategic arms control, one desperately needed given the lack of progress over the decade since the treaty was signed. Faced with a challenging and potentially untrustworthy negotiating partner in the Russian Federation, U.S. interlocutors have explored multiple conceptual pathways in arms control, such as deeper cuts on delivery vehicles, agreements on total warhead limits, “freezes,” multilateral approaches, and a spectrum of transparency and confidence-building measures.³ Despite some of these maturing to formal U.S. proposals, all have been met with limited to no success. Given the lack of progress and the worsening security environment, sizeable divides and heated disagreements remain in the United States between those who see strategic arms control as a net benefit to be pursued for its own purposes, those who view it analytically as a national security policy tool, and those who see it as a self-imposed limitation to be tolerated only if it can be accomplished at minimal cost and maximal gain.

For advocates of further arms control, there is brisk debate in the form of a future agreement. In one camp are those who advocate for incremental advances built on the successes of the last 50 years of bilateral strategic arms control. This legacy runs from the Strategic Arms Limitation Talks (SALT) through the New START Treaty in terms of its definitions, structures, mechanisms, and pathways to lower overall numbers. The concepts for future progress discussed by this camp typically run in two directions: 1) a new legally-binding bilateral arms control agreement focused on deployed strategic warheads and strategic delivery vehicles that accounts for new kinds of Russian nuclear-armed strategic offensive arms, or 2) a new legally binding bilateral arms control agreement that focuses on warheads—deployed and non-deployed, strategic and non-strategic—to address asymmetries in the U.S and Russian arsenals.

3 For a more in-depth look at this subject, see Michael Albertson, *Negotiating with Putin's Russia: Lessons Learned from a Lost Decade of Bilateral Arms Control*, Center for Global Security Research, Lawrence Livermore National Laboratory (2021). <https://cgsr.llnl.gov/content/assets/docs/CGSR-LivermorePaper9.pdf>. Accessed October 7, 2021.

In the other camp are those who believe that bilateral strategic arms control as it has been practiced to this point has run its course. Cold War arms control is either dead or on life support. Bold new approaches are needed given multipolar or multidomain complexities. The concepts discussed within this camp include: 1) a legally-binding bilateral arms control agreement focused on all systems which impact “strategic stability,” with levels of ambition ranging from traditional capabilities like missile defense to newer capabilities like conventional long-range strike and emerging domains such as space and cyber; 2) a legally-binding multilateral arms control agreement, with the U.S. seeking to include China’s emerging triad and Russia pressing as it has for decades for the United Kingdom and France to be included as U.S. nuclear allies; or 3) a politically binding agreement centered on unilateral or reciprocal transparency and confidence building measures.

The arms control community is not suffering from a lack of ideas on the general format of the next agreement. The central problem is that the form of the agreement has consistently been placed over the purpose of the agreement in the search for a path forward. But as the architect Louis Sullivan commented, “form ever follows function.” In contrast to the preoccupation with form, this study will analyze the key substantive questions underlying the function of a potential future arms control framework. What is the function of arms control in today’s security environment? What are the substantive strategic stability- and deterrence-related problems we are trying to solve using arms control? What are the metrics we use to judge these problems and their solutions? How can arms control—whatever form it may take—best be shaped against these existing and anticipated problems?

Central to the conceptualization, negotiation, and ratification of any successful arms control agreement is a clear understanding of how effective a given treaty is at achieving specific U.S. national security objectives. These underlying political and military objectives are determined before the negotiations begin and are maintained as key goals by U.S. officials during the negotiations process. Oftentimes, however, these objectives are overshadowed by a focus on the numerical limits within these agreements.

- The SALT II Treaty, for example, had three separate elements highlighted in its committee report. It emphasized “imposing meaningful

constraints on the Soviet Union while not jeopardizing critical U.S. strategic programs, the national will to pursue the strategic programs we need to maintain essential equivalence with the Soviet Union, and a commitment to significant arms reductions in future agreements.”⁴

- From a military standpoint, the INF Treaty focused on eliminating a specific military capability that represented only a small fraction of the overall nuclear delivery capacity of each side but one that was viewed as particularly threatening and destabilizing for regional and global stability. The committee report also noted the political significance of the agreement for the United States and its allies, such as the “triumph of solidarity for the NATO Alliance,” a strengthened Western European confidence in the U.S. commitment to the defense of Europe, and a “potentially significant change in the dynamics of East-West confrontation.”⁵
- The START Treaty rested on the fundamental premise that the United States and the Soviet Union had a “common interest in reducing the risk of nuclear war and enhancing strategic stability.” The core objectives of the START Treaty were as follows:
 1. Enhancing stability in times of crisis by giving preferential treatment to stabilizing systems such as bombers and cruise missiles, placing stringent limits on deployed ballistic missiles and warheads, and putting special restrictive limits on destabilizing heavy intercontinental ballistic missiles (ICBMs).
 2. Significantly reducing strategic arms below current levels.
 3. Maintaining equality of U.S. forces relative to those of the Soviet Union.
 4. Creating an agreement that was effectively verifiable.
 5. Ensuring the agreement was supported by the American and allied publics.⁶

4 U.S. Government Printing Office, *The SALT II Treaty: Report of the Committee on Foreign Relations United States Senate Together with Supplemental and Minority Views*, Executive Report No. 96-14 (November 19, 1979), p35.

5 U.S. Government Printing Office, *The INF Treaty: Report of the Committee on Foreign Relations, United States Senate*, Executive Report No. 100-15 (April 14, 1988), pp2-3.

6 U.S. Government Printing Office, *Treaty with the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms (The START Treaty)*, Treaty Doc. 102-20 (November 25, 1991), ppIV-V.

- The New START Treaty was designed to promote transparency and predictability in the strategic relationship between the United States and Russia through mutual reductions and limitations on the world's two largest nuclear arsenals. The letter of transmittal highlighted that this agreement would preserve the ability for the United States to determine the composition and structure of its strategic forces, allow for the modernization these forces, and would in no way limit the testing, development, or deployment of current or planned missile defense or long-range conventional strike capabilities.⁷

Therefore, before getting into the details about the forms and modalities of potential arms control, it makes sense to start with a detailed analysis of the deterrence and strategic stability issues to be addressed in such an agreement.

Three broad sets of issues will be addressed in the following sections to first categorize and then analyze different types of deterrence-related strategic stability objectives:

1. **Quantitative symmetries and asymmetries:** where are the parties similar and dissimilar in terms of numbers, outputs, and throughputs?
2. **Risks and the concepts of strategic stability:** where are there evident risks in crisis dynamics and arms race dynamics? Do they stem from perceptions or misperceptions, and is the primary driver one of concrete capabilities or perceived intentions?
3. **Externalities and instabilities:** what are the factors outside of the agreement that drive internal dynamics, and can these forces be understood and managed?

These categories are not distinct. They are often interconnected and demonstrate the complex nature of existing bilateral and multilateral strategic stability dynamics. It is difficult to address only one deterrence problem using arms control. Moreover, there is also no one-size-fits-all solution to these problems. Certain arms control mechanisms and

⁷ U.S. Government Printing Office, *Treaty with Russia on Measures for Further Reduction and Limitation of Strategic Offensive Arms*, Treaty Doc. 111-5 (May 13, 2010), pIII.

transparency and confidence building measures are likely better structured to handle some of these issues, or more specifically some dimensions of a particular issue, than others. Identification of the correct deterrence problem, however, is integral to beginning the process to find the proper arms control solution. Simply put, the function of deterrence ever defines the form of arms control.

Exploring Quantitative Symmetries and Asymmetries

One broad category of deterrence and strategic stability objectives can be derived from an analysis of quantitative, or numerical, asymmetries. The first analytic challenge involves identifying the asymmetries, which includes determining the numerical trend lines, understanding the items that are the sources of these asymmetries, and specifying how the items in question are to be defined, identified, and ultimately limited. The second challenge is determining the importance of the asymmetry. Does it matter for deterrence or strategic stability? If so, how? Finally, both sides need to determine how the asymmetry is to be addressed. Should it be tackled directly or indirectly? Should the resolution be implemented through strict limitations, reductions, or prohibitions? Or should softer methods be used, such as transparency and confidence building measures?

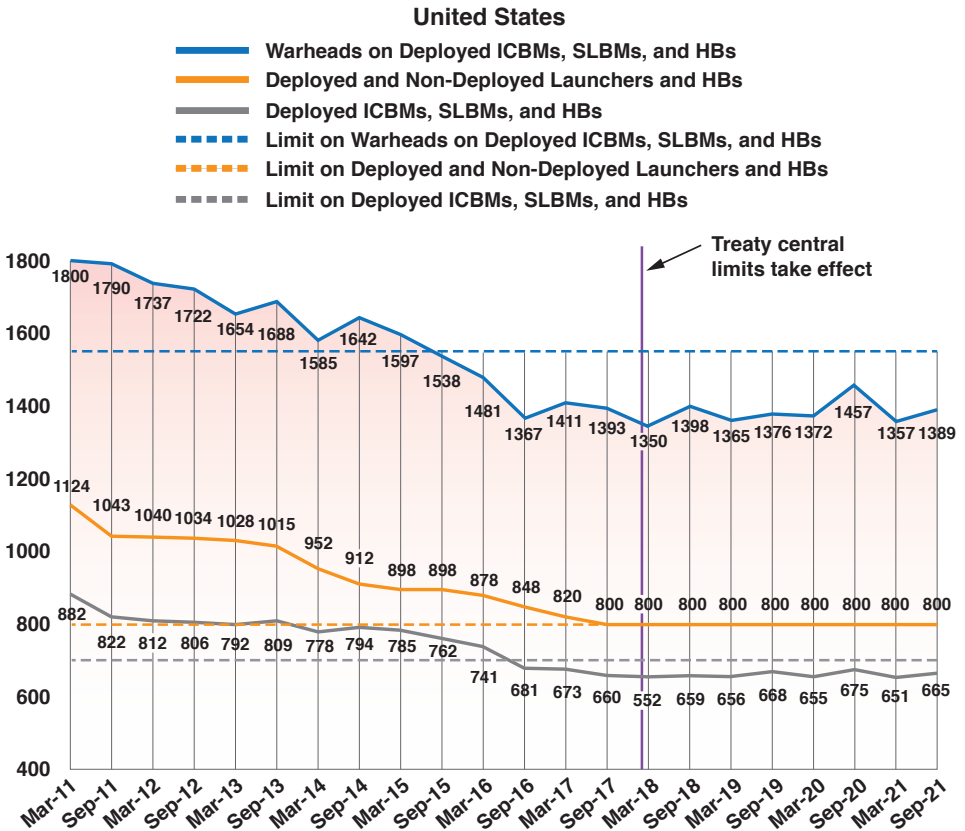
There has historically been a single, central, arms control-related benchmark: the **overall nuclear balance** between the United States and the Soviet Union/Russia. In the initial stages of arms control, this balance was marked by the numbers of strategic-range ballistic missiles (ICBMs and submarine launched ballistic missiles, or SLBMs) on each side. Over time, this expanded to include heavy bombers within the category of strategic-range delivery systems, albeit using artificial counting rules given their supposedly stabilizing nature and the fact that they did not have weapons deployed on them on a day-to-day operational basis. Later, the exact number of warheads deployed on ICBMs and SLBMs were also included as numerical limitations in agreements, with heavy bombers still using a counting rule.

The New START Treaty has codified the benchmark of the overall nuclear balance over the last decade by providing clear and unclassified quantitative benchmarks of parity between the United States and Russia at the strategic level:

- 700 deployed intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and heavy bombers (HBs)
- 1,550 warheads on deployed ICBMs and SLBMs and warheads counted for deployed heavy bombers
- 800 deployed and non-deployed ICBM launchers, SLBM launchers, and heavy bombers

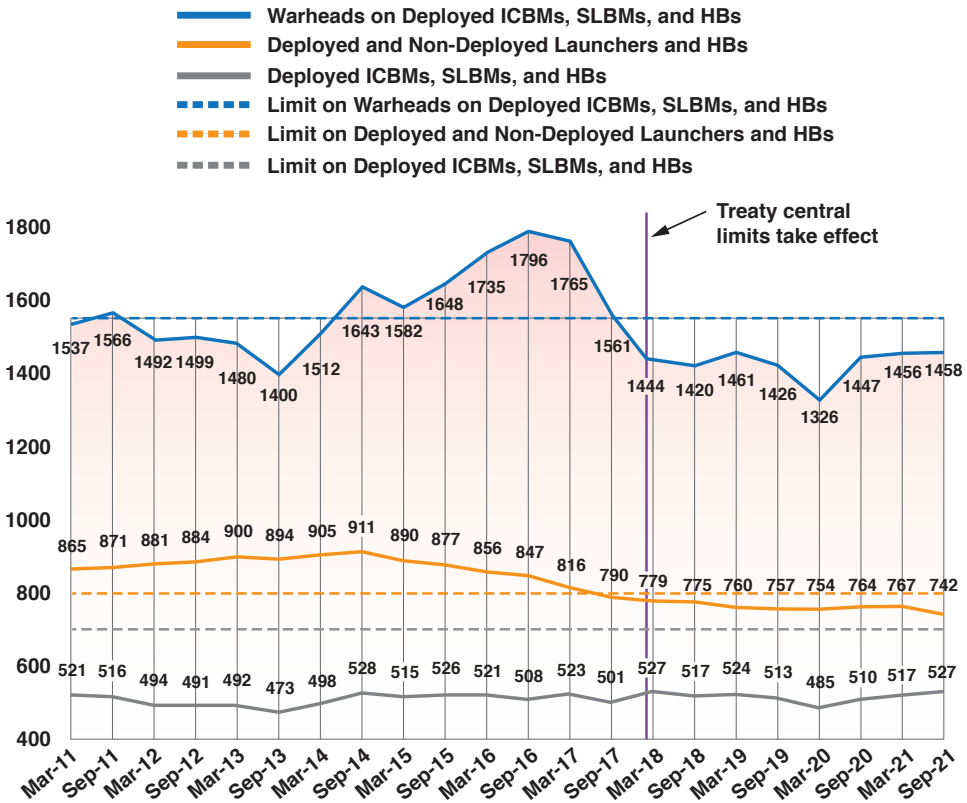
	Quantitative Symmetry or Asymmetry	Qualitative Implications
Overall nuclear balance	Symmetry, as codified and highlighted by New START	Each side has no obvious incentive to engage in a large first strike
Overall warhead numbers	Symmetry, in the information available to the expert community	Each side can hedge against changes by the other side (which can counterintuitively tamp down on arms racing, because no one needs to build new capabilities to have some upload cushion)
Stockpile composition	Major asymmetries, between non-deployed strategic warheads and tactical nuclear warheads	Russian advantage in the ability to threaten limited use in theater
Strategic force structure	Asymmetries, both in terms of historical differences in triad emphasis as well as Russian focus on systems with multiple independently targetable reentry vehicles (MIRVs), mobile ICBMs, and new kinds of strategic offensive arms	U.S. upload advantages diminishing Mobile ICBMs provide more survivability Russian ability to exploit novel systems for deterrence and coercive advantage
Pace and timing of strategic modernization cycles	Asymmetries, both in terms of the numbers of types of systems on either side and the timing offset between Russian and U.S. modernization cycles	U.S. advantage in that it can still shape its current cycle to respond to Russian developments (whereas Russia's cycle is largely complete)
Nuclear infrastructure	Major asymmetries, both in terms of the nuclear complex's processing/production capacity as well as warhead lifecycles	Russian ability to respond quickly (and hedge) to new developments and requirements

Changes in the numbers over the last 10 years are depicted in the following charts (assembled by the State Department from the biannual data exchanges required by the Treaty).⁸ While these declarations are comprehensive, only the information related to the Treaty's central limits is typically released to the public. Using these numbers as the agreed benchmark for the overall nuclear balance, there appears to be parity between the two sides. The only notable difference is the lower number of Russian-deployed launchers.



8 U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms of the United States and the Russian Federation, February 2011–September 2020" (March 5, 2021). <https://www.state.gov/new-start-treaty-aggregate-numbers-of-strategic-offensive-arms-of-the-united-states-and-the-russian-federation-february-2011-september-2020/>. Accessed October 7, 2021.

Russian Federation



This benchmark has proven durable. During the last decade, challenges have been raised and addressed within this narrow construct. The first was the increase in the number of deployed Russian warheads prior to the Treaty’s central limits coming into effect in February 2018. Russia came quickly down in the second half of 2017 to ensure compliance with the Treaty’s central limits when they came into force. The second was the narrative that the Russians were allowed to build upward, while the United States was forced to reduce downward. But this narrative mischaracterized and misconstrued the technical nature of compliance steps on both sides given their respective force structures and modernization cycles. American reductions were achieved primarily through “converting” launchers under the Treaty, allowing the United States to maintain the launcher as a non-nuclear system, or through arms control bookkeeping to take legacy systems carried over from START I—such as the B-1—off the formal books. Russia, in the middle of its

strategic modernization program throughout the duration of the agreement, has replaced Soviet legacy systems with new systems, but this modernization has been effectively capped under the New START limits. Finally, the new nuclear-armed delivery systems mentioned in President Putin’s March 2018 speech sparked discussion in the expert community that these were unconstrained by the New START Treaty. It later came to be understood, and the Russians themselves agreed, that some of these systems met the definitions of strategic delivery vehicles under the Treaty, while others fell into the category of “new kinds of strategic offensive arms” which could be discussed but not necessarily limited in the context of the Treaty.⁹

The next benchmark metric regarding deterrence and strategic stability has typically been **overall stockpile composition**, based on the foundational assumption on both sides that rough parity or equivalence needed to be maintained in overall numbers between the United States and Russia to prevent coercion and preserve stability. Calculations based on the sufficiency to meet operational requirements sometimes complements—and conflicts—the psychological desire to be seen as “second to none.” The numbers in the open press most cited by the expert community on the strategic nuclear balance come from the *Bulletin of the Atomic Scientists*.¹⁰

	United States	Russia
Total Stockpile	3,800	4,497
Retired and Awaiting Dismantlement	1,750	1,760
Total Inventory	5,550	6,257

Again, at this metric, there is a snapshot of rough parity between the two sides, particularly given the rough methodology behind the numbers estimated for each side.

Major asymmetries begin to emerge, however, one level deeper in the analysis. The first asymmetry is in the composition of the **total stockpile** outside of the New START Treaty limits and the estimated warheads in the

9 For an excellent overview on these issues and systems see Amy Woolf, “Russia’s Nuclear Weapons: Doctrine, Forces, and Modernization,” Congressional Research Service R45861 (September 13, 2021). <https://crsreports.congress.gov/product/pdf/R/R45861>. Accessed October 7, 2021.

10 Hans M. Kristensen and Matt Korda, “Nuclear Notebook: How many nuclear weapons does Russia have in 2021?,” *Bulletin of the Atomic Scientists* (March 15, 2021). <https://thebulletin.org/premium/2021-03/nuclear-notebook-russian-nuclear-weapons-2021/>. Accessed October 7, 2021.

retired and awaiting dismantlement category. This portion largely consists of two categories of warheads: non-deployed warheads for strategic systems and warheads for shorter- to intermediate-range systems [also known as non-strategic nuclear warheads (NSNW)]. Because of its warhead lifecycle, its geopolitical threat picture, and its strategy and force posture decisions over the last 30 years, the United States has maintained many non-deployed strategic warheads and a small number of NSNW. In contrast, due to very different calculations and capacities in these three areas, Russia's total stockpile is estimated to have a much smaller number of non-deployed strategic warheads and a much larger number of NSNWs (around 2,000, according to most estimates).

This asymmetry has been at the root of many of the U.S.-Russian discussions on threat perceptions over the last 30 years. More recently, it has become a greater challenge for bilateral arms control. To Moscow, the United States has a breakout capability with its non-deployed strategic warheads, which could be uploaded on ICBMs and SLBMs in a crisis or in the absence of formal arms control limitations. Russia also complains about the threatening nature of U.S. tactical nuclear weapons that are forward deployed in Europe as part of NATO's nuclear sharing arrangements.¹¹ In turn, Washington sees major problems with the size and scope of Russia's tactical nuclear warhead arsenal, particularly when paired with perceptions of Russia's evolving nuclear doctrine.¹² The issues include the estimated numbers of tactical warheads that Moscow retains, the number of dual-use tactical delivery systems Moscow has in its current arsenal and is developing for the future, and the locations of stored tactical nuclear weapons near operational units all over Russia.¹³ These problems are exacerbated by Russia's lack of transparency and its doctrinal discussions and publications over the last three decades on limited nuclear use to change the course of a major conventional conflict. These long-standing asymmetries have been largely static over the past 30 years, due

11 One example among many can be found at: Nuclear Threat Initiative, "Russia Seeks Nonstrategic Nuke Talks With U.S." (November 8, 2012). <https://www.nti.org/gsn/article/russia-calls-talks-nonstrategic-nukes/>. Accessed October 7, 2021.

12 U.S. Department of Defense, *2018 Nuclear Posture Review* (February 2018). 2018 Nuclear Posture Review Final Report (defense.gov). Accessed October 7, 2021.

13 Hans Kristensen, "Russian Non-Strategic Nuclear Weapons," Federation of American Scientists (May 1, 2012). https://www.jstor.org/stable/resrep18934.9?seq=1#metadata_info_tab_contents. Accessed October 7, 2021.

to factors such as threat perceptions, operational requirements, extended deterrence considerations, and defense industrial capacities. There is a significant cognitive barrier to be overcome for these items to be brought to the negotiating table, after decades of hardening policy positions that they should not be up for discussion.

Strategic upload capacity is an asymmetrical subset worth monitoring within the stockpile composition category. Long an area of Russian concern about U.S. strategic capabilities, the asymmetry in non-deployed strategic warheads appears to be narrowing as Moscow continues its strategic modernization program that emphasizes multiple independently targetable re-entry vehicle equipped (MIRVed) systems, a strong nuclear warhead production capacity, and a strategic force structure based on flexible payloads designed to overcome and defeat U.S. missile defenses. As the Russian upload capacity visibly increases, the U.S. upload capacity remains stable but comes with a set of question marks for the future. What will be the ultimate size and composition of the U.S. strategic triad? What are the upload capacities of future U.S. ICBM and SLBM systems compared to the systems they are replacing? Will the United States maintain the current estimated levels of non-deployed strategic warheads in the stockpile? In a world with stable arms control agreements and legally binding restrictions on deployed warheads, the issue of upload capacity is in the background rather than on stage. However, as the end of such agreements approaches or the durability of such agreements erodes, serious questions will begin to arise on breakout timelines and maximum upload capacity.

The second asymmetry is **strategic force structure**, one which has long existed in the respective emphasis each side places on various components of their nuclear arsenal. With its two-ocean naval presence, the United States has long valued the retaliatory role of the nuclear-powered, ballistic missile-carrying submarines (SSBNs)—and under New START has placed most of its warheads on these platforms. The United States also has maintained many dual-capable heavy bombers in its operational inventory, which deploy around the world on a regular basis conducting conventional strike missions and regional assurance exercises. Russia, in turn, has always placed its emphasis on its land-based ICBMs—both silo-based and road-mobile—because of its geographic depth and its historical emphasis

on land power and artillery over sea and air power.¹⁴ Russia has strategic delivery systems which the United States does not in its mobile ICBMs, and its negotiators were fiercely protective in the New START negotiations of any provisions which would be discriminatory against these systems. Russia also has a wider variety of ICBM types, versions, and variants¹⁵ than the United States, due to basing modes as well as bureaucratic competition between competing missile design bureaus and the need to maintain liquid and solid propulsion defense firms. Russia has also placed a greater emphasis on larger MIRVed systems, which can carry a wide assortment of nuclear payloads as well as substituting warhead hooks for advanced missile defense countermeasures.

Because of their historical legacy and perceived importance within the respective triads, strategic delivery systems have different assessed values within the two strategic force constructs, making seemingly one-for-one or apples-for-apples trades more difficult in reality than in the abstract. To Moscow, an American ICBM likely carries lesser weight in a one-for-one trade than a Russian ICBM. Likewise, an American SSBN is likely more valuable to a U.S. force planner than a Russian SSBN is to their counterpart. This makes it more likely that the “freedom to mix” concept within specified overall limits in New START will continue in the future, rather than a treaty regimen which focuses on specific limits or prohibitions on various legs of the legacy strategic triad.

The issue of “haves” and “have nots” has also traditionally been asymmetric in force compositions, with one side arguing that a technological development and deployment by the other side is dangerous or destabilizing. Typically, this problem exists only until the other side has developed a better understanding of employment concepts and strategic thinking. Going one step further, this also occurs when the other side has matched the development and deployment of these systems with its

14 Notable, however, is the fact that the United States at present has more deployed ICBMs than Russia. The difference in emphasis comes from the fact that the U.S. Minuteman III ICBMs all carry a single warhead, while most Russian systems are MIRVed. For more on the history of the various legs of the Russian strategic triad, see Chapters 4-6 in Pavel Podvig, ed., *Russian Strategic Nuclear Forces* (Cambridge, MA: MIT Press, 2001).

15 “Types,” “versions,” and “variants” are specific terms of art in strategic arms control and are important regarding requirements concerning exhibitions and distinguishability during on-site inspections. A new “type” of ICBM or SLBM must have certain technical characteristics which differ in some noted respect from previous types. A new “version” of a mobile launcher of ICBMs has external or functional differences from previous versions. A new “variant” of ICBMs, SLBMs, and heavy bombers has a declared distinguishing feature unlike others of the same type.

own (as was the case with MIRVs in the Cold War or more recently with conventional precision strike ALCMs on heavy bombers). In most cases, there is rough parity in force composition when comparing the triads, and the major current difference in force composition—Russia’s mobile ICBMs—is usually seen as a stabilizing aspect given their importance to a guaranteed survivable second strike.

More recently, however, in response to its concerns about missile defenses and conventional precision strike capabilities, Russia is looking to expand beyond the traditional strategic triad of ICBMs, SLBMs, and heavy bombers. This was evident when President Putin announced new kinds of nuclear-powered strategic offensive arms in a March 2018 speech.¹⁶ U.S. policymakers and experts have varied in their assessments of the problematic nature of these systems, the environmental dangers of their onboard nuclear power plants, their destabilizing nature, their high degree of estimated destructive capacity, their unknown timing for use in a conflict, and their accountability under existing arms control regimes.¹⁷ Nevertheless, given that past strategic arms control regimes focused on range and warhead payload, any future agreement on strategic-range delivery vehicles or the nuclear warheads located on such delivery vehicles would likely expand the existing definitions or draft new definitions to include these systems currently under testing or development.

The third asymmetry is the **pace and timing of the strategic modernization cycle** in each country. While historically these cycles have been driven by a variety of technological and bureaucratic factors, pace and timing often fall victim to fundamental attribution error. Modernization by the other party is attributed to nefarious political or military intent, a message by one side to the other that it will out-innovate or out-produce the other to gain strategic or coercive advantage. In contrast, modernization of one’s own arsenal is seen as a positive, stabilizing factor to maintain the status quo or improve safety and reliability of one’s forces.

16 “New kinds of strategic offensive arms” is a term used in the New START Treaty to mean a system that by its very definition is not an ICBM, SLBM, or heavy bomber. Either party can raise the issue of new kinds of strategic offensive arms in the treaty’s consultative implementation body, but there is no formal requirement to capture such systems within the treaty’s central limits or verification regime.

17 For an excellent overview on the available information on these systems, see Woolf, “Russia’s Nuclear Weapons: Doctrine, Forces, and Modernization.”

The central challenge in the current asynchronous modernization cycle is that unlike during the Cold War, U.S. senior officials have only recently been paying much attention to Russia's strategic modernization. For the first decade of the 2000s, the assumption was that Russia was doing everything in its power to keep its strategic triad afloat, and that the numerical decline of the post-Cold War era would continue. Russia's strategic modernization was seen as largely irrelevant to U.S. strategic interests in an era focused on counterterrorism and wars in Iraq and Afghanistan. The ratification debate over the New START Treaty centered more on what it meant for U.S. modernization and non-nuclear capabilities than concerns over where Russia's modernization might be taking its own force. Ironically, it was only in the wake of Russia's conventional aggression in Ukraine that many senior policymakers began to more deeply explore the broader implications of Russia's well-underway strategic modernization on the U.S. program of record. This has left many struggling to play catchup with Russia; what the country has today is the product of sustained effort, having overcome multiple setbacks over the last two decades.

As mentioned earlier, Russia tends historically to have more types, versions, and variants of its strategic delivery vehicles, and these platforms tend to have shorter recommended life cycles. Rather than focusing on refurbishment, Russia tends to emphasize elimination and production, with a delivery vehicle being replaced either by a newer version or variant of the same system or a new type of system. Following the nadir of the Russian military in the economic collapse of the 1990s, strategic modernization was a clear priority from the beginning of President Putin's term in office. Soviet legacy systems built in the 1970s and 1980s were approaching the end of their service lives, a problem exacerbated by issues with funding and maintenance and the fact that some sectors of the Soviet defense industry had to be reconstituted inside of Russia.¹⁸ The replacement of Soviet legacy systems drew senior Kremlin attention by the early 2000s, which led to the limited production of new systems in the mid- to late 2000s. This led to steady progress in the 2010s toward replacing legacy ICBMs and SLBMs with newly produced solid-propellant systems. By the end of the 2010s, Russia felt comfortable enough with the work it had done to modernize and replace the

¹⁸ The foremost example is the heavy ICBM-related liquid propellant industries left in Ukraine when the Soviet Union broke apart. Another is the Minsk Automotive Plant in Belarus which manufactures mobile transporter-erector-launchers for Russian mobile missile systems.

main pillars in its strategic triad—so it began spending energy and resources on the funding, development, and testing of the new heavy liquid-propellant ICBM and new kinds of nuclear-powered strategic offensive arms.

The United States, in contrast, tends to have fewer types, versions, and variants of its systems. U.S. design bureaus place greater emphasis on resilience to the effects of time and technological change, thus focusing on refurbishment and life extension programs rather than elimination and new production. Furthermore, the United States is only now beginning its major post-Cold War strategic modernization program, based on a largely one-for-one replacement of its existing delivery systems by a single type of missile or heavy bomber.

The final and most often overlooked asymmetry is the **nuclear infrastructure capacity** in Russia and the United States. Along with its delivery systems, Russia has prioritized maintaining and modernizing a large and robust nuclear infrastructure. The Director of the Defense Intelligence Agency stated in 2019 that “in contrast to the United States, during the past decade Russia has improved and expanded its production complex, which has the capacity to process thousands of warheads annually.”¹⁹ Part of this asymmetry is based on the requirements of the force, as the maintenance and modernization of a warm processing line was needed to support the broader nuclear modernization effort started by President Putin in the early 2000s. The other part of this is Russian warhead design. Russian warheads reportedly have a shelf life of approximately 10-15 years, due to the degradation of their conventional high explosive and fissile components. Their deployment cycle is reported to be three years long, after which they are removed from their delivery systems, shipped to a serial production facility for modernization and refurbishment, and then placed in storage prior to a new cycle of operational deployment.²⁰ Thus warheads

19 The term “process” is chosen carefully in this statement. Processing is not the same as production. Instead, it is a combination of production, refurbishment, and dismantlement—with the total capacity of the production complex divided between these three efforts depending on force and stockpile requirements in any given year. Rebecca Heinrichs, “Transcript: The Arms Control Landscape ft. DIA Lt. Gen. Robert P. Ashley, Jr.,” Hudson Institute (May 31, 2019). <https://www.hudson.org/research/15063-transcript-the-arms-control-landscape-ft-dia-lt-gen-robert-p-ashley-jr>. Accessed October 7, 2021.

20 Russian warhead lifecycle details were taken from the statements of the former head of the 12th Main Directorate of the Russian Ministry of Defense. The organization is responsible for warhead security, maintenance, operations, and transportation. Oleg Bukharin, “A Breakdown of Breakout: U.S. and Russian Warhead Production Capabilities,” Arms Control Association. <https://www.armscontrol.org/act/2002-10/features/breakdown-breakout-us-russian-warhead-production-capabilities#notes>. Accessed October 7, 2021.

are always cycling through the complex as they move between production, deployment, refurbishment, and elimination.

The robustness and size of the Russian nuclear complex stands in stark contrast to that of the United States. The 2018 Nuclear Posture Review was filled with dire warnings about the atrophy of the U.S. nuclear weapons complex. It included the following assessments:

- “The U.S. capability to produce plutonium pits is limited to research and development pits unsuitable for stockpile use.”
- “U.S. production of tritium, a critical strategic material for nuclear weapons, is now insufficient to meet the forthcoming U.S. nuclear force sustainment demands, or to hedge against unforeseen developments.”
- “The U.S. is also unable to produce or process a number of other critical materials, including lithium and enriched uranium.”

These were only a few of the major shortcomings noted in the report.²¹ NNSA’s current goal is to increase its plutonium processing and pit-manufacturing capabilities to meet requirements to produce no fewer than 80 pits per year during 2030.²² Even with such an increase, this falls well below the processing capacity numbers associated with the Russian complex. In terms of shelf life and warhead design, the Nuclear Matters Handbook notes that from 1945-1991, U.S. nuclear warheads were designed, developed, produced, and deployed to the stockpile typically for a period of 15-20 years, after which they were retired and dismantled to be replaced by new, more modern weapons.²³ This stockpile management process was replaced with the stockpile life extension and surveillance program in the early 1990s.

Summary of quantitative symmetries and asymmetries: Most experts explore only the first level of the quantitative symmetry/asymmetry analysis—the overall nuclear balance and overall warhead numbers. The likely

21 2018 Nuclear Posture Review, p62.

22 National Nuclear Security Administration, “Plutonium Pit Production,” <https://www.energy.gov/nnsa/plutonium-pit-production>. Accessed October 7, 2021.

23 U.S. Department of Defense, *Nuclear Matters Handbook 2020*, p57. <https://www.acq.osd.mil/ncbdp/nm//NMHB2020rev/>. Accessed October 7, 2021.

reason is because the numbers are the most readily available and easily understandable information in a treaty. The U.S. State Department publishes the biannual data exchanges made possible by the New START Treaty on deployed and non-deployed strategic delivery vehicles and deployed strategic warheads. The United States's transparency on its overall stockpile and its nuclear capable systems is paired with estimates of Russian capabilities to provide an unclassified comparison of the two largest nuclear powers in terms of overall warheads numbers. Upon looking at these two sets of data, there appears to be a great deal of symmetry between the two sides on the surface—which would suggest plenty of common ground and trade space on future arms control and further reductions.

At the next level of analysis, however, deeper asymmetries begin to appear in warhead numbers. The United States emphasizes non-deployed strategic warheads and Russia emphasizes tactical nuclear warheads, due primarily to stockpile requirements and perceived regional security threats, respectively. The two sides likely have different weights on the various legs of the triad, and the Russian side has begun to deploy a wider variety of newer delivery systems as part of its strategic modernization program. Here, the challenges can be seen as significant.

Tensions in the asymmetries: Three major tensions remain in examining quantitative asymmetries and their potential effects on arms control. The first is the psychological dimension of the “haves” and “have nots,” both in terms of delivery systems and warheads. Given the U.S. strategic modernization program's replacement of existing systems for largely comparable systems, Russia will have unique systems in the form of mobile ICBMs, heavy liquid propellant silo-based ICBMs, and potentially nuclear-powered, nuclear-armed delivery systems. These have value precisely because they are different; there is no clean one-for-one trade. Future analysis is likely required here on whether these uniquely Russian systems impact the strategic balance because of the lack of clarity—likely purposeful on the part of the Russian government—in terms of intended numbers and purpose. If they do matter, then determine how much and what is the best method and lowest trade cost for addressing them in a future arms control agreement. If they do not matter, then find suitable reciprocal concessions in the negotiations for allowing the Russians to keep them from being explicitly addressed. With regards to warheads, the question for each side is whether the numerical differences in composition matter in a meaningful

way. Is Russia seriously concerned about U.S. strategic upload potential, or is this concern fading given their successful strategic modernization program? Is the United States truly concerned about the numbers of Russian tactical nuclear warheads, or is their concern centered more on potential use or doctrinal importance than numbers and locations?

The second tension, and the one frequently missed in analysis, is in the significant asymmetries in the capacities of the nuclear complex in the United States and Russia. No matter the form of the agreement, anything that focuses on limiting or reducing the number of delivery vehicles or warheads will leave untouched the challenge of the latent breakout capability and upload/download capability posed by Russia's robust nuclear infrastructure. This capability will not necessarily result from a stated desire by Russia to possess a breakout capability; it is instead an inherent function of Russian warhead design and lifecycle and a Kremlin emphasis on redundancy and hedging in their nuclear forces. Nevertheless, this is a major asymmetry, one which potentially gives Russia more flexibility to adjust to new geopolitical circumstances or security requirements in the future. It is also representative of the kinds of complex challenges traditional arms control and net assessment will have to tackle in the future.

Depending on the level of ambition, a verification regime likely exists for warheads located on deployed or non-deployed delivery systems, as well as for warheads located at storage facilities. Inspecting such items would likely combine well-known on-site inspection procedures from New START with new technology developed for such an agreement. The challenge, however, will lie in the production and dismantlement stage (i.e., when does a "warhead" or "weapon" come into and out of accountability for purposes of an agreement), because of the sensitivities associated with nuclear warhead design, the sizes of the objects, the facilities, and the fact that warheads will be in some degree of parts and pieces as they undergo production, dismantlement, or refurbishment. All of these factors will make accountability and thus verification more difficult, and there will likely be a heated ratification debate on confidence levels regarding cheating and breakout scenarios. The data derived from the Treaty will be important to both sides' understanding of the operational warhead lifecycle of the other, which has been missing in past agreements and has led to fears on both sides about the capabilities and intentions of the other.

If there is a numerical cap on warheads, there will likely be interest in the question of what overall processing capacity means for a Russian warhead breakout capability. The best guess at such a number can be drawn from the limited information available. Russian warheads have an estimated life of 10-15 years, thus somewhere between around 7 to 10 percent of the total stockpile would need to be produced on average annually. The warhead lifecycles in the total stockpile may not be uniform, however, given the wide variety of warheads in the Russian arsenal; some years may see more focus on new production, and others on dismantlement or simple refurbishment. But something above this 7 to 10 percent number—such as a doubling (14-20 percent of the stockpile) or tripling (21-30 percent of the stockpile) in a given year—would likely raise questions. As will be explored in later sections of the paper, the question will be on whether such a capacity should be limited explicitly through a hard cap on warhead production or another mechanism such as notification or consultative discussions.

The third and final dimension is the asymmetries in the arsenals of other nuclear states: for the United States, this is China's expanding nuclear force today and perhaps that of North Korea in the future; for Russia, its long-standing focus on U.S. allies in the U.K. and French nuclear forces. As the sizes of the U.S. and Russian arsenal have decreased, they have also increased in importance. The increasing tension in the bilateral dynamic from other nuclear states is especially true of China, which has not been transparent about the ultimate goal of its current nuclear expansion. The recent revelations in the open press have highlighted that China's growing numbers are likely to impact any future internal and bilateral U.S. and Russian decisions on force planning and arms control. This situation is compounded by Beijing's refusal to get involved in arms control, transparency, or official strategic stability-related discussions, despite the erosion of its long-standing line of being far below the numbers of the U.S. and Russian arsenals. Like arms control debates in the Cold War, the ratification debate of any future agreement may focus more on what a treaty does not limit than what it does. As we will see in the following section, moving beyond bilateral agreements brings challenges of depth and complexity. Key structural questions remain about agreements with unequal quantitative players. These nuclear arsenal asymmetries will have a major impact on a next agreement, either by their inclusion or by their exclusion.

Understanding Risks and the Concept of Strategic Stability

“Strategic stability” is a term that has elicited a great deal of heated discussion both inside and outside of government circles.²⁴ Thus it is important to begin any discussion on the risks associated with strategic stability by selecting a definition to be used. Edward (Ted) Warner, the DOD lead for the New START negotiations, outlined three ways the term is typically used. First and most commonly, it is used in a very narrow sense regarding U.S. nuclear weapons strategy and doctrine, traditionally confined to challenges related to 1) first-strike or crisis stability and 2) arms race stability. Crisis stability pertains to the absence of incentives to use military force or more specifically nuclear weapons first, and arms race stability refers to the absence of incentives to build up an overwhelming military or nuclear force. There are also two broader usages of the term: an overall balance of military power (nuclear, conventional, and other domains) or the comprehensive assessment of a balance of geopolitical power that includes military, economic, political, and informational power.²⁵ These different varieties of the same term are often used interchangeably in reference to capabilities and intentions being strategically “stabilizing” or “destabilizing.” Such a fluid definition often increases the level of confusion in both domestic and international contexts, leading to unsuccessful efforts to come up with an agreed definition or a new definition for what experts or policymakers are talking about in a particular meeting or about a particular issue.

The perceptions of other states are important to understand here—both to avoid confusion in terminology and to understand the interests of the other side. At its heart, how Russia and China choose to define

24 For an excellent study of the various historical interpretations of strategic stability, see Elbridge A. Colby and Michael S. Gerson, eds., *Strategic Stability: Contending Interpretations* (Carlisle, PA: U.S. Army War College Press, 2013).

25 James Action, “Reclaiming Strategic Stability,” Carnegie Endowment for International Peace (February 5, 2013). <https://carnegieendowment.org/2013/02/05/reclaiming-strategic-stability-pub-51032#:~:text=Defining%20Crisis%20and%20Arms%20Race%20Stability.%20The%20theory,being%20pre-empted%20could%20itself%20create%20pressure%20to%20pre-empt.> Accessed October 7, 2021.

and use the term “strategic stability” has little to do with a lack of a shared understanding of how the United States uses the term and what it means. Instead, their definitional selection is a conscious attempt by both countries to deflect attention away from what they do not want to discuss, reduce, or limit (namely their nuclear forces and theater power projection capabilities) and focus on issues that they do want to focus (such as areas of comparative U.S. advantage). Russia, for example, traditionally uses the term “strategic stability” to mean the overall military balance (primarily to try and capture capabilities like U.S. long-range conventional strike, strategic and theater missile defenses, potential space-based weapons, and U.S. forces deployed near Russian territory). Its expansion of the term also deflects attention away from issues that the United States prioritizes such as Russian tactical nuclear weapons and nuclear use doctrine—and attempts to paint a picture of a United States that is more capable and threatening to Russia. China tends to focus on ideas like “balance” and “symmetry” when it discusses what it does and does not want to talk about or participate in. Like the Russians, the country uses the term freely in its diplo-speak that agreements or developments should “promote strategic

	Risks Seen by the United States	Risks Seen by Russia
Crisis Stability – Capabilities	Russia preparing for regional conflict enabled by threat of nuclear use	U.S. preparing for disarming conventional strike enabled by missile defenses
Crisis Stability – Intentions	Russia seeking to foment crises on its borders to undermine global order	U.S. seeking to foment crises on Russia’s borders to foment regime change
Arms Race Stability – Capabilities	Russia developing unnecessary, but potentially destabilizing, set of nuclear capabilities	U.S. developing capabilities designed to defeat Russia’s nuclear deterrent
Arms Race Stability – Intentions	Russia is racing ahead, but unclear as to the level of concern	U.S. remains the pacesetter

stability.” This in turn helps deflect attention away from Beijing’s opaque nuclear expansion and its refusal to participate in arms control and strategic stability discussions.

Thus this analysis, like any other that wades into the massive topic of strategic stability, must specifically define the term. Given familiarity in U.S. deterrence theory, I will use the narrowest usage of the term (i.e., crisis stability and arms race stability) in the context of the two primary components of threat perception (capabilities and intentions) as it pertains to nuclear weapons.

The Perception of Crisis Stability Risks through the Lens of Capabilities

The U.S. side sees potential risks on both the low-end and high-end of the nuclear spectrum when it examines existing and emerging Russian capabilities. The capabilities composing the core of the Russian nuclear triad—with the potential exception of heavy silo-based ICBMs, which were always viewed as problematic as a first-strike or use-or-lose capability—are not questioned by the U.S. side in terms of crisis stability. Russian road-mobile ICBMs, even when MIRVed, are largely viewed like heavy bombers or SSBNs, with their survivability seen as a stabilizing asset.

The United States does see crisis stability risks in Russia’s extensive arsenal of non-strategic nuclear warheads, especially when paired with revisions in Moscow’s nuclear doctrine which suggest a willingness to use nuclear weapons first in a conventional conflict to signal resolve and terminate the conflict on terms favorable to Russia. These risks include the size of this arsenal (which the U.S. side views as too large), the composition of this arsenal (with many dual-capable systems in the current and planned Russian force), the storage locations for these weapons (including potentially storage in the Russian enclave of Kaliningrad²⁶), and the historically assessed problems of inadvertent crisis escalation in comingling conventional and nuclear systems. There is also the challenge of new dual-capable sea-launched cruise missiles, which become strategic in nature given their ability to target the U.S. homeland.

The United States also perceives crisis stability risks with the emerging set of Russian “novel” nuclear capabilities. On the one hand, these can be

26 Lauren Said-Moorhouse, “Russia may have upgraded nuclear bunker in Kaliningrad, report says,” CNN (June 18, 2018). <https://www.cnn.com/2018/06/18/europe/russia-kaliningrad-nuclear-bunker-intl/index.html>. Accessed October 7, 2021.

viewed as redundant. To many, Russia does not need a transoceanic nuclear-powered torpedo, a nuclear-armed hypersonic glide vehicle, or a nuclear-powered, nuclear-armed cruise missile to overwhelm or defeat existing or planned U.S. missile defenses. Some would argue this redundancy is based on Russia's worst-case scenarios about U.S. future capabilities. Others have seen a more sinister intent beyond these capabilities, providing Russia with either a coercive capability in a crisis, or even a nuclear first strike capability given the speeds and novel trajectories of these assets. These experts ask why Russia would spend the time and money to develop such systems if not to achieve new strategic or coercive aims.

Russia has a very different set of fears regarding U.S. capabilities in crisis situations. The core U.S. nuclear triad capabilities are not viewed as destabilizing to the Russian side. These systems have been analyzed over two-plus decades of strategic arms control, and information on replacement systems such as the Ground-Based Strategic Deterrent (GBSD) ICBM and the Columbia-class SSBN is widely available. There were criticisms of comingling conventional and nuclear warheads on U.S. strategic delivery vehicles because of fears of discrimination in a crisis, but those U.S. capabilities were only debated and not ultimately fielded. The Russian dislike of U.S. tactical nuclear weapons in the form of the B61 nuclear bombs in Europe is centered less on their capabilities and more on their proximity to the Russian homeland. The Russians argue this makes these weapons "strategic" rather than "tactical." This is an easy wedge issue for Russia, however, given the importance of these weapons to the NATO nuclear deterrent and collective defense.

Russia's central fear regarding crisis stability has less to do with U.S. nuclear capabilities than other advanced non-nuclear kinetic and non-kinetic capabilities. Moscow's primary worst-case scenario—central to their military modernization, defense spending, and research and development over the last three decades—is the idea of a disarming first strike by the United States against Russia's nuclear forces. In this scenario, a U.S. first strike would be supported by its layered missile defenses capable of handling remaining Russian nuclear forces, and U.S. nuclear forces would serve as further coercive leverage to discourage Russian retaliation. To U.S. senior leadership, this is a paranoid fantasy well beyond America's capabilities and outside of its intentions.

Seen from the Russian perspective, however, this is not an irrational fear or outlandish scenario. Soviet and later Russian military thinkers have seen throughout their long careers examples of breakthrough U.S. technologies which have been directly targeted against Russia's main military deterrent—its strategic nuclear forces. In a manner of self-fulfilling prophecy, these military thinkers have also seen cases where Russia was repeatedly assured that certain programs would not be directed against Moscow, yet later observed that the U.S. openly messaged the programs as responses to Russian actions. Furthermore, Russia has seen the United States use conventional precision strikes to disarm lesser adversaries prior to a ground invasion or compel an enemy into political capitulation or regime change. From Moscow's perspective, everything the United States does is ultimately designed with potential use against Russia in mind. The United States thus has the means to attempt such an operation and has shown its willingness to do so in a crisis. This is particularly worrisome considering the rapidly changing pace of technology and the view that the United States remains ahead in certain military capabilities.

The Perception of Crisis Stability Risks through the Lens of Intentions

Both sides are currently operating in an environment of extreme mistrust and worst-case assumptions and assessments about the other. Despite exchanges of views on geopolitical threats and military doctrine in Track 1 venues such as strategic stability discussions and in various Track 1.5/2 dialogues, the environment remains largely unchanged.²⁷ These venues have been notable for the long-standing lists of mutual grievances which remain unresolved, the very different interpretations formed of the post-Cold War era, and a general climate of tit-for-tat actions that have led to the current low point in the bilateral relationship between Russia and the United States. Dialogue is important but can only go so far.

As a result, should a crisis emerge on Russia's periphery, both sides will assume the worst in the other's intentions. Both sides will be suffering from confirmation bias and the desire to find malicious intent in the other as each processes a flood of information far beyond that faced in Georgia in 2008 and Ukraine in 2014. There is a dominant strain of thinking in Russia

²⁷ An excellent set of articles on the problems post-Ukraine in the bilateral relationship can be found at: Carnegie Forum, *Rebuilding U.S.-Russia Relations*. <https://perspectives.carnegie.org/us-russia/>. Accessed October 7, 2021.

that color revolutions are designed to weaken Moscow along its periphery. This same line of thinking also believes that such revolutions represent a trial run by the United States to either test or deliberately incite (or encourage) a similar event in Moscow—an event designed to lead to regime change and the establishment of a Russian leader acquiescent to a U.S.-led unipolar world order. If this is the United States’s perceived goal, then everything taking place at the lower end of the peacetime conflict spectrum is a sustained operation for this purpose, and U.S. military capabilities are the means to achieve this goal if non-military means of competition and confrontation fail. On the reverse side, the United States sees Russia as a revisionist and expansionist power which will attempt to subvert or reverse the post-Cold War order along its borders. It has already demonstrated its willingness to ignore the rules of the existing global order to weaken and divide its neighbors, target U.S. allies, lie about its actions, and use military force to attempt to change international borders.

The question in any crisis that emerges on Russia’s borders will be intent, and—in an atmosphere of mutual dislike, distrust, and open competition—how to avoid misperceptions, miscommunication, and inadvertent escalation. The fact that Moscow often deliberately obfuscates its intent during a crisis further complicates analysis and response. This is particularly true in a scenario where both the United States and Russia find parallels between developments on the ground and each side’s “worst-case” scenario: the United States testing its plan to combine color revolutions and a pre-emptive first strike to disarm and overthrow the Russian government (from Russia’s perspective), and Russia testing its plan to create a conventional fait accompli under the shadow of its willingness to use nuclear weapons first (from the U.S. perspective). Russia may also purposefully air its misperceptions about U.S. goals to justify its actions, making an assessment of its intentions in regards to crisis stability even more difficult. It is precisely the combination of crisis capabilities and crisis intentions which makes this such a risky scenario to contemplate, and one which is a worthy test case to see if arms control can solve the problem.

The Perception of Arms Race Stability Risks through the Lens of Capabilities

Cycles of strategic modernization for the United States and the Soviet Union/Russia have rarely coincided. Before the advent of the reductions-based strategic arms control process (i.e., START I, II, and III; SORT;

and New START), the result was often both sides interpreting military developments by the other as destabilizing, looming windows of vulnerability, and attempts to catch up—acts that would then set off a reaction by the other, thus resetting and repeating the cycle. Compounding the challenge of competing modernization cycles—especially during the Cold War—were strong constituencies in both countries that rejected the basic concepts of parity, equivalence, stability, or arms control. This was competition for huge stakes with winners and losers. Throughout the Putin era, reconstituting Russia’s crumbling Soviet-legacy strategic triad was largely viewed with little interest, given U.S. attention elsewhere. As it approaches its largely successful end stages, however, it is seen as a threat to a U.S. force that is now just beginning its own modernization and replacement program.

It is unclear whether arms race stability risks will continue in the future with respect to the strategic triad as Russia moves into the latter stages of its modernization program and the United States begins its own. What will happen, for example, when Russia has completed its modernization program? Will it feel comfortable with its capabilities and flexibility, or begin a new cycle centered on novel systems? Will the United States feel a need to revisit its program of record in light of extant Russian (and Chinese) capabilities? These cycles of vulnerability and catch up may re-emerge in a world where formal strategic arms control disappears, and buildup dynamics flourish in an atmosphere of mistrust and great power competition. It is also possible that both sides, remembering the lessons of the late stages of the Cold War, choose not to build up and compete in this area of the strategic triad. Both sides will maintain production infrastructure but choose to compete in the lower and middle ends of the conflict spectrum. Alternatively, rapid technological innovation may constantly shift offense-defense dynamics, leading to the need to constantly update existing systems or develop and deploy new ones.

The key challenges to be solved in terms of arms race stability risks are two-fold. First, the question is how to solve the ongoing, multifaceted offense-defense dynamic. There are several interlocking actions and reactions that cascade between nations and regions. For example, one problem involves Russian and Chinese nuclear capabilities that are deployed in part in response to U.S. missile defenses. U.S. missile defenses in turn are deployed in response to the expanded capabilities of third-party states like the Democratic People’s Republic of Korea (DPRK), but Moscow and

Beijing see this buildup as a response to their own improving capabilities. In turn, aspirations for quantitatively or qualitatively improved U.S. missile defense capabilities fuel discussion of directing U.S. missile defenses against Russian and Chinese capabilities, and thus the cycle repeats.

The second question is how to address the arms race dynamics of the growing capabilities of conventional or emerging/disruptive technologies to target, disable, and destroy the nuclear deterrent capabilities of the other side. During the Cold War, the dynamics were between nuclear forces. In the post-Cold War era, the dynamics are between U.S. nuclear primacy and the impact of missile defenses and conventional precision strike against an atrophied Soviet-legacy deterrent. In the future, arms race stability risks could go in several directions with cyber, space-based, and increasingly unmanned and artificial intelligence-enabled capabilities. Russia, perpetually driven by historical fears of weakness and surprise attack, has diversified its nuclear forces in a few different directions during its current modernization program. Its novel systems suggest this will continue in the future. In contrast, the United States has focused on replacing and largely replicating its existing nuclear forces in its next modernization cycle, slowly upgrading its missile defenses in an attempt to stay ahead of DPRK developments, and continuing to expand its conventional strike systems to cope with anti-access area denial environments.

The Perception of Arms Race Stability Risks through the Lens of Intentions

The end of the Cold War did not remove doubts in the minds of Russian thinkers regarding the intentions of the United States. Consequently, the Russian military likely spends the vast majority of its time thinking about the United States—the pacing threat with which Russia must compete. On the one hand, highlighting the United States as a clear and present danger to Russian security is a convenient bogeyman, allowing Kremlin leadership to restrict political freedoms, the Russian military to request a larger piece of the national budget, and the Russian defense industry to demand increased funding for its programs. On the other hand, this fear of U.S. intentions is deeply ingrained in Russian thinking. It is unlikely to be replaced by another country (such as China) in the near future.

The lesson of Russian history imparted by Putin is clear: Russian weakness—military backwardness, economic stagnation, and political division—has resulted repeatedly in foreign invasion, devastation, and

occupation.²⁸ In an environment of extreme mistrust, every program the U.S. military develops and deploys is viewed as increasing the ability of the United States to defeat Russia, whether this is an openly stated U.S. policy goal or not. This goes as far as a Russian-held belief that any U.S. system which is considered and ultimately discarded continues to be developed in secret. As long as the United States remains the central military threat in Russian military thinking, U.S. capabilities continue to advance, and topics like containment and regime change remain a recurring feature in U.S. foreign policy discourse—there is little U.S. officials can do to change how certain entrenched groups in the Russian political and military bureaucracy perceive their intentions.

Conversely, for most of the last 30 years, the United States has spent little time thinking about the intentions of Kremlin leadership and the Russian military. Attention has been focused instead on more pressing immediate regional crises, the global war on terrorism, the nuclear challenges posed by Iran and North Korea, and a dawning great power competition with China. U.S. perceptions of where Russia fits in the global order have also shifted dramatically over this period: a collapsing former superpower, potential new member of the European order, ally in the global war on terrorism, revisionist or malicious actor, great power competitor, and so on. Throughout all of this, however, Russia has rarely—despite Moscow’s beliefs to the contrary—been the main driver for the development and deployment of U.S. weapons systems. Instead, U.S. systems tend to be developed for other primary purposes; these systems are only later messaged as part of a response to Russian capabilities or actions, thus confirming the beliefs in Moscow that these were about Russia from the beginning. Only recently, as the Russian military modernization program has demonstrated its successes, have U.S. thinkers returned to the topic of regional and strategic arms race dynamics driven by Moscow.

Summarizing the Risks of Crisis and Arms Race Stability

As seen through this analysis, traditional strategic stability risks exist between the United States and Russia. However, it is quite telling that these are not the immediately solvable, tactical problems that proposed arms

²⁸ For a wonderful study of the Russian use of history, see Mark Galeotti, *A Short History of Russia: How the World's Largest Country Invented Itself, from the Pagans to Putin* (Toronto: Hanover Square Press, 2021).

control and transparency or confidence-building measures are frequently centered around. Although always present in worst case analyses, neither side worries day to day about an attempted disarming nuclear first strike by the other, which was the main crisis stability and arms racing fear of the Cold War. Instead, instabilities are increasingly driven by longer-term dynamics unrelated to the strategic nuclear triad in a climate of mutual political mistrust. For Russia, this is the threat posed by U.S. missile defenses and conventional precision strike capabilities. For the United States, it is the Russian buildup of its theater nuclear capabilities and its expansion into new strategic delivery systems. Each of these capabilities drive specific fears held by the other—that the United States is bent on neutralizing Russia’s nuclear deterrent (and hence its independence) and that Russia is willing and able to challenge the European order under the shadow of nuclear use. Where numerical limitations and legally binding verification provisions exist, there has been a buildup of confidence and trust in the capabilities of the other. Where such measures have been absent, competition and worst-case analyses have emerged, exacerbated by Russia’s singular focus on the United States and the periodic but capable focus of the United States on Russia.

But as we will see in the next section, drivers from worst case analysis of one side by the other in the U.S.-Russia dynamic can only explain so much of what is happening. Both sides feel that trust of the other is unwarranted given their interpretation of recent historical events. In this environment, it should be no surprise that each side has chosen to focus on improving its capabilities and thus enhancing its assessed security from threats posed by the other. This is done outside of a cooperative framework. What some see as destabilizing arms racing in this case may be a stabilizing influence, an attempt to ensure security and perceived balance in an environment where trust is absent and unlikely to be restored in the near future. Many of these stability dynamics, however, are exacerbated by the increasing impact of externalities outside of the U.S.-Russian relationship, which complicates a diagnosis both of deterrence functions and the potential of several forms of arms control.

Recognizing Externalities and Instabilities

Outside of quantitative asymmetries and traditional strategic stability risks, there are three major externalities driving the development of a new and complex set of deterrence-related strategic stability objectives. In many respects, these externalities are outpacing and eclipsing the bilateral dynamics between the United States and Russia, increasing the conceptual challenges to deterrence, and the complexity of potential arms control solutions. These externalities are well known. Their frequent mentions in deterrence discourse show that they are having a major impact. Solutions, however, are bureaucratically or substantively complicated to understand and propose. The question—again one which likely requires more analysis or a more detailed net assessment approach—is to what extent they will cause instabilities in the future.

Externality	Impact
The trajectory of China's nuclear forces	Uncertainty over the end point of China's modernization program undermines the longstanding two-party dynamic of strategic stability
Regional nuclear states and missile defense	Complex action-reaction cycles in offense-defense and conventional-nuclear between the United States, U.S. allies, Russia, China, and emerging third-party nuclear powers complicate finding lasting solutions via agreements
Emerging and disruptive technology	Breakthroughs could hamper or destroy long-held beliefs underlying traditional strategic stability concepts, capabilities, and solutions

Externality 1: The trajectory of China's nuclear forces. Legally binding strategic arms control has primarily been a dyadic framework between the two countries with far and away the largest nuclear arsenals in the United

States and the Soviet Union/Russia. As mentioned in the asymmetries section, other states such as the United Kingdom, France, and China have historically been highlighted for inclusion but have declined to participate. The much lower numbers of these third-party actors have led most to believe that further bilateral steps could be taken before other P5 states would need to be involved in formal arms control. Likewise, neither the United States nor the Soviet Union/Russia highlighted that these other states were driving major changes in nuclear force size, composition, policy, or doctrine.

This two-party dynamic may very well change over the next decade. The overall trajectory of China's nuclear forces was laid out in the *2020 China Military Power Report*:

- China's strategic ambitions, evolving view of the security landscape, and concerns over survivability are driving significant changes to the size, capabilities, and readiness of its nuclear forces.
- China's nuclear forces will significantly evolve over the next decade as it modernizes, diversifies, and increases the number of its land-, sea-, and air-based nuclear delivery platforms.
- Over the next decade, China's nuclear warhead stockpile—currently estimated to be in the low 200s—is projected to at least double in size as China expands and modernizes its nuclear forces.
- China is pursuing a “nuclear triad” with the development of a nuclear capable air-launched ballistic missile (ALBM) and improving its ground and sea-based nuclear capabilities.
- New developments in 2019 further suggest that China intends to increase the peacetime readiness of its nuclear forces by moving to a launch-on-warning (LOW) posture with an expanded silo-based force.²⁹

The precise end point of this modernization remains unclear. Is the end point full numerical parity, where China intends at this moment to continue expanding its nuclear arsenal until it reaches a quantitative level with the United States and Russia? The Chinese have frequently stated that

²⁹ Office of the Secretary of Defense, *Annual Report: Military Developments Regarding the People's Republic of China*, p1X. <https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF>. Accessed October 7, 2021.

numerical parity is not something they value or their ultimate end goal, but this may have changed.³⁰ Is the end point simply qualitative improvement, with a modernized strategic triad and expanded numbers providing a more secure second-strike capability at lower numbers than the United States and Russia? If so, the challenge is estimating where that point lies and how that affects U.S.-Russian levels under New START or a subsequent agreement. Or is the end point ultimately fluid rather than fixed, where even China's political and military leadership do not know at present where force numbers are headed because these are dependent on external variables like missile defense technologies and conventional force balance? This would seem the most likely case but would be more complex to study and predict both the causes and effects in this shifting equation.

Assuming China remains uncooperative on both nuclear transparency and future arms control, this instability will be particularly problematic. The United States cares much more about this unknown end point of a Chinese nuclear force than Russia. Moscow will likely remain fixed on the United States as the only threat that matters, either dismissing the threat posed by China's increasing strategic forces or even secretly rooting for an increased Chinese force as a way of lessening the focus on Russia. Russia and China have a strategic partnership, and if that fails then Russia has a large arsenal of dual-capable non-strategic systems as a hedge against this geopolitical scenario of an adversarial China. In contrast, the United States will increasingly care about China's expanding forces, leading it to potentially walk away from bilateral discussions focused only on Russia. Washington may pursue changes in its posture and policies aimed at the threat posed by China that will also influence Russia's threat perceptions of the United States.

This is an external instability that can be theorized about but not accurately predicted at this time. China's forces may not quickly reach the level of the United States and Russia, and thus the two-party focus can continue for the near future. As its forces increase, China could grow more confident and more willing to engage, and there can be a successful transition from a two-party to a three-party process in arms control. In the least optimistic scenario—and perhaps the more likely of the two—China's

30 See for example, Li Bin, "Differences Between Chinese and U.S. Nuclear Thinking and Their Origins," in *Understanding Chinese Nuclear Thinking*, Lin Bin and Tong Zhao, eds. (Washington, DC: Carnegie Endowment for International Peace, 2016), pp3-18.

increase causes the long-standing two-party dynamic to dissolve, and increasing multipolar complexities prevent the creation of a new stable three-party relationship on strategic stability.

Externality 2: U.S. extended deterrence, homeland missile defense, and regional nuclear states. The second major externality driving instability has been the challenge to the United States and its allies from the North Korean and Iranian nuclear and ballistic missile programs. The rapid progress of the North Korean program over the last decade has led to military responses from the United States both to assure allies and to protect the U.S. homeland.³¹ These responses, including the deployment of regional missile defense architectures and aspirations of an increasing robust and layered future homeland missile defense system, have driven offensive responses by both Russia and China, who view these defenses as directed at them and designed to neutralize their assured second-strike capability.³² As in the first externality, there is an asymmetry in DPRK/Iran-related threat perceptions between the United States, Russia, and China, and thus sharp differences in the assessed rationale and proportionality of the U.S. response to the challenge.

A familiar action-reaction dynamic emerges in this complex relationship between a third-party state, the United States, U.S. allies, and Russia and China. The third-party state expands its nuclear and ballistic missile program. The United States responds, either to assure its allies against the regional threat or to protect the U.S. homeland or U.S. forces abroad, through the deployment of existing capabilities into the theater or through the development of new systems targeted against the third-state threat. Russia and China complain on the grounds that U.S. actions are undermining regional stability or strategic stability, and the United States responds that these are in response to the third-party state and not directed against Russia or China. Russia and China, unconvinced by these assurances, develop their own countermeasures, mainly in the form of more offensive systems designed to defeat U.S. defenses. Future U.S. developments are then often placed into a broader context of a response to Russian and Chinese offensive actions, leading Moscow and Beijing to

31 See the *2018 Nuclear Posture Review* and *2019 Missile Defense Review*.

32 The proportional extent to which Russian and Chinese force developments have been driven by U.S. missile defenses is a topic of much debate. There is fairly broad consensus, however, that U.S. missile defenses are one of many important factors.

believe they were correct in their assumption that the third-party threat was only a ruse used to target them.

This cycle is driving force developments in separate but competing lanes. North Korea is expanding and increasing its nuclear forces and improving the survivability of its delivery systems to address the improved capabilities of U.S. missile defenses and conventional precision strike assets. Russia is looking at new strategic delivery systems and countermeasures, and China is expanding its own nuclear forces to gain a secure second-strike capability. Two factors are keeping this cycle from growing more unstable—the constraints on Russian forces in the New START Treaty and the low numbers of North Korean systems. If either of these factors change, however, the potential for large-scale arms race risks would greatly increase.

Externality 3: The impact of emerging and disruptive technologies.

Finally, there is the third externality, the recognized but non-assessable impact of emerging and disruptive technologies on the existing model of deterrence and strategic stability. Artificial intelligence, cyber, quantum computing, directed energy, additive manufacturing, nanotechnology, space-based capabilities—all have been identified as areas where intended or unintended instabilities could emerge. Assessments of impact, however, vary greatly in the literature, with some experts seeing major shifts and others seeing more continuity than change, or more benefits than downsides for the United States.³³

These technologies are areas of stated competition between the United States, China, and Russia, with each side seeking advancements capable of giving them a political, economic, or military edge against the others. If an “arms race” exists, it is in these areas of emerging technology. Because of potentially rapid advancements in these areas, it is difficult to guarantee that longstanding assumptions underpinning strategic stability will continue into the future. Russia, China, and North Korea have placed a great deal of emphasis on the survivability of road-mobile ICBM systems; improved scanning and detection may make these systems more visible and thus targetable in the future, calling into question their reliability as second-strike systems. The United States in turn could see its emphasis

33 See for example Brandon Williams et al., “Workshop Report Latency Unleashed: The Military Implications of Emerging Technologies,” Center for Global Security Research, Lawrence Livermore National Laboratory (July 20-22, 2021). https://cgsr.llnl.gov/content/assets/docs/Workshop-Summary_Latency_Unleashed_The_Military_Implications_of_Emerging_Technologies.pdf. Accessed October 7, 2021.

on SSBNs for its retaliatory capability undermined by new advancements in undersea detection. Silo-based systems may become vulnerable to strike or disablement by systems other than nuclear. Centralized nuclear command and control may become more questionable in a crisis. Because of the known uncertainties in this area, the safest future path seems to be one with a great deal of flexibility and hedging, redundancy, and responsiveness, both in terms of systems and capabilities and in terms of the production infrastructure needed to support a shift caused by technological surprise.

Applying Metrics to the Evaluation of Arms Control

Introduction

Every metric identified below should be conceptualized as a point on a sliding scale, rather than a switch either in one position or another. Depending on the deterrence-related objectives of the agreement and the relative value a side places on a particular objective, these metrics will be adjusted in one direction or the other as needed or as chosen.

Two important interrelationships should be noted as one thinks about the idea of deterrence-related metrics. The first is that these metrics are all interconnected. Sliding one metric along its scale will likely move the needle left or right on other associated metrics. These interconnections may not always be readily apparent to an outside observer focused on a single metric. For example, agreements with a greater level of ambition will likely be more complex and more costly. Depth in an agreement with Russia in the nuclear domain likely comes at the expense of breadth in terms of players and capabilities.

The second is that each metric, when pushed to its minimum or maximum extremes, involves increased costs or risks. There are many false preconceptions that exist about arms control agreements, just as there are in most individuals' approaches to negotiations in general. Most of the problematic thinking with these preconceptions lies at the extremes, the ideas that certain things must be fully maximized for an agreement to be in one's interest. But maximization of any one factor at the expense of all others likely leads to a less than optimal outcome. As in considering multiple job offers, the one with the largest salary may not be the one that works the best for an individual. Commute time, work-life balance, hours worked per week, and many others likely come into consideration. Similarly, an arms control agreement with the longest possible duration may not always be the best in achieving lasting results. An agreement at the lowest levels is not always the most stable or durable. An agreement with the most intrusive verification regime may be too costly or complex to implement.

These examples are intended to encourage thinking about a potential Pareto optimum within a particular metric, as well as an optimum amongst the various metrics. This optimum is usually the result of an assessment that balances the benefits versus costs of moving further in one direction or the other. Overemphasis will lead to unnecessary costs and complications, and underemphasis will result in criticisms and value left on the table. To achieve the best outcome for U.S. national security objectives, an agreement must be tailored that balances the following five metrics (explained in later in detail):

- 1. Depth** – how far does it go in addressing U.S.-Russian bilateral issues?
- 2. Breadth** – how far does it go in addressing more players or domains?
- 3. Durability** – how much will it contribute to long-term stability and planning?
- 4. Complexity** – how will the agreement be understood, negotiated, and implemented?
- 5. Cost** – can the objectives be met at an acceptable price?

Categories of Metrics

Depth of Agreement – The “depth” metric assesses how the agreement tackles the central bilateral challenges to U.S.-Russian dynamics identified in the previous section. How deeply does it go into addressing the various levels of quantitative symmetries and asymmetries? To what extent does it cover the expanding list of nuclear-related concerns regarding non-strategic nuclear capabilities, conventional strike, and missile defenses? Does it at all address issues related to political intentions, particularly worst-case assumptions regarding crises and regime change? The central questions for decisionmakers are 1) where to prioritize going deeper and 2) how deep to dig in each particular area. The Russian negotiating style is straightforward but challenging: wait for the other side to make the first proposal, stick to your position until the very end, use time to weaken the other side’s patience, and never give anything away without getting something in return. Determining where and how far to dig is critical, as each request and each new level of depth comes with increasing costs on Russian demands and tradeoffs regarding the other metrics outlined in this section.

Depth will likely, but not necessarily, come at the expense of breadth, as the time, energy, and trade space needed to make progress with Russia bilaterally on these new and complex issues will make it more difficult to expand the number of participants at the table or into new domains such as cyber and space. Depth, if tackled correctly, can improve the durability of the agreement, as the more issues that can be resolved now means less need for future amendments or follow-on agreements. Depth does, however, likely mean increased complexity and increased costs, as one would anticipate with an agreement trying to go deeper into the issues than its predecessors (which only covered strategic delivery systems and warheads located on front sections). Finally, increased depth will strain the feasibility of the agreement, as a diminished interagency and a partisan political climate attempt to gauge the proper level of ambition for the agreement.

Low Depth ←————→ **High Depth**

Going broader into other domains		Going deeper with Russia on nuclear-related issues
Bringing in other players into formal arms control		Making forward progress with Russia
Minor nuclear asymmetries added to New START framework (e.g., novel systems)		Major remaining nuclear asymmetries addressed (i.e., stockpile disparities, infrastructure)
Little to no coverage of missile defenses		Detailed coverage of missile defenses
Little to no coverage of conventional strike		Detailed coverage of conventional strike
No language on broader strategic stability related issues		Increased language on these issues (e.g., legally binding language in preamble, unilateral statements, corresponding political agreements)

Breadth of Agreement – The “breadth” metric assesses the ability of the agreement to address objectives outside of the traditional U.S.-Russian bilateral relationship, either expanding the set of players at the tables or expanding the set of topics with Russia into new domains. This would include factors such as China’s nuclear trajectory, extended deterrence and

assurance of allies in both Europe and Asia, other U.S. arms control and nonproliferation policy goals [e.g., P5 nuclear cooperation, Treaty on the Non-Proliferation of Nuclear Weapons (NPT) diplomacy, Iran/DPRK], other domains such as cyber and space, and broader dynamics such as the forms and trajectory of the subsequent, post-agreement competition. As with depth, breadth requires identification of where to focus and to what degree.

The challenge with breadth is determining practical boundaries. Going broader into these areas appear promising on the surface and natural areas for progress for ambitious analysts or negotiators. All of these areas remain largely untackled in arms control for underlying complications related to other metrics like cost, complexity, and durability. For example, China has refused to participate in legally binding strategic arms control and has placed a high price for its future participation: the United States and Russia must reduce their nuclear force levels down to that of China. The dynamics between extended deterrence relationships with allies—either in the form of systems such as the U.S. B-61 gravity bombs forward deployed in Europe or in the form of alliance political management—are increasingly complex, raising questions of how much consultation and input are required with allies on agreements to which they are not parties. While attempts are made to aggregate arms control agreements and create a holistic arms control strategy, agreements are in fact seldom linked. Their bureaucracies remain stovepiped inside the U.S. government, and progress in one area has often failed to build the necessary momentum to overcome challenges in other regimes. Finally, efforts to bring new domains like cyber and space into an arms control regime have failed owing to the lack of incentives for restraint and well-understood challenges like definitions, verification, and enforcement.

Because these are new and largely unexplored areas, it will be difficult to assess how far it is necessary to go and how much time and energy needs to be expended to achieve something viable, valuable, and durable. Bilateral strategic arms control has had decades of experience upon which to add—agreed definitions, agreement structure, onsite inspections, data exchanges, handling of confidential information, payment of costs, and protections and immunities for inspectors. Much of this work regarding breadth would need to be done from scratch, or at least significant time would need to be spent socializing new participants on why things should be done a certain way based on historical successes. New parties will likely remain reluctant to go too far, and even experienced parties will be reticent to move into

new domains. The question then becomes whether an agreement, however difficult to negotiate, is judged sufficiently deep enough to address the new problem set in a ratification debate filled with tensions between aspirational rhetoric and negotiable reality.

Limited Depth ←————→ **Wide Depth**

U.S.-Russian bilateral focus		Inclusion of China in the agreement
U.S.-Russian bilateral focus		Involvement of other P5 members
U.S.-Russian bilateral focus		Active engagement and negotiation of U.S. extended deterrence forces and relationships
Primary focus on getting the singular agreement done		Use of agreement as leverage or momentum for other U.S. arms control initiatives
New domains not present in the agreement		Some attempt is made to tackle new domains impacting nuclear strategic stability (separate agreements, unilateral statements, preambulatory language)

Durability of Agreement – The “durability” metric is composed of several factors. The first factor is the prescribed duration of the agreement (that is, is the agreement long enough to justify the sunk costs in negotiation, ratification, and implementation). In strategic arms control, there are precedents of both fixed duration and unlimited duration agreements. Fixed duration agreements often require revision or replacement once the terms of the agreement have been met and raise questions of breakout and unconstrained arsenals near the conclusion of the agreement, but they benefit from the requirement to replace an existing agreement with one better adapted to the present security environment. Unlimited duration agreements present the optics of having solved the agreement once and for all but present challenges of growing outdated and needing replacement, require long-term attention to the erosion of compliance, and remain unsatisfactory to parties that demand continuous further progress on the arms control agenda.

The second factor is the structuring of milestones within the agreement. Is the agreement front-loaded, back-loaded, or open-ended in terms of its milestones? In past U.S.-Russian agreements regarding numerical restrictions or prohibitions, this has been a relatively straightforward formulation—i.e. “have no more than X number of Y system by Z date” or “completely eliminate Y system by Z date.” Some agreements frontload eliminating or reducing items seen as particularly dangerous or destabilizing, or inspecting particular locations or systems of concern, while others take a longer-term approach to broader force restructuring and reductions. These are milestones which will depend on the depth or breadth of the agreement and should be carefully considered in terms of ensuring mutual attention and compliance for the duration of an agreement.

The third factor is senior-level political buy in. Is this an agreement that the senior leadership on both sides will view in their respective national security interests in the future? An agreement that is too one sided or partisan is unlikely to be a lasting agreement, as one party would have strong incentives to find means (whether legally argued or otherwise) to circumvent compliance with the agreement. Agreements without mutual buy-in also tend to become viewed as trade chips in the bilateral relationship or in a broader multilateral agenda, with mistaken impressions of “one side wants it more” becoming conflated with leverage on other difficult issues in the bilateral or multilateral relationship.

The fourth factor is flexibility. Does the agreement have mechanisms for discussion and resolution should a dispute occur in treaty compliance, legal interpretation, or implementation? This is usually done in bilateral implementation bodies that are legally required to meet at regular intervals to discuss treaty concerns. Moreover, does the treaty have flexibility to evolve with an ever-changing security environment, or does it require re-negotiation and re-ratification to solve central challenges which arise? The challenge comes here with legislative oversight of the agreement. Some degree of flexibility is necessary, but treaty ratification often prohibits the amount of flexibility the executive branch has for making changes to an agreement the United States Senate has considered and agreed to.

The final factor is bureaucratic buy in. Durability requires both parties to be satisfied for the duration of the agreement, and for all the bureaucratic players within the systems on each side to be satisfied. This is critical given the bureaucratic dynamics seen in the erosion of arms control norms in

both the United States and Russia where various actors have questioned or undermined various agreements. This becomes of particular importance in the U.S. system with the Senate’s ratification process for legally binding agreements. While the bar for success is much higher, the ability of the New START Treaty to withstand the partisan and bilateral climate over the last 10 years demonstrates the durability of agreements with this process of buy in.

Low Durability ←————→ **High Durability**

Poorly conceived duration—either too short (won’t survive political transition) or indefinite (little incentive to make progress)		Properly conceived duration – likely 10+ years (capable of surviving periods of diplomatic stagnation in relationship)
Milestones either too onerous to meet or too permissive to endure		Milestones properly spaced, likely on a scale to ensure continuous progress
One-sided/lopsided/”unfair”		Balanced/”fair”
Partisan		Bipartisan
Low emphasis on implementation discussion and dispute resolution		High emphasis on implementation discussion and dispute resolution
Low flexibility to adaptation		High flexibility to adaptation

Complexity of Agreement – The “complexity” metric attempts to measure the level of complication and sophistication in the agreement. Some degree of increased complexity is likely needed, as arms control likely needs to be updated to meet modern security concerns and deterrence grows more multi-faceted or multi-domain in nature. Complexity for complexity’s sake can be counterproductive however, as an agreement which grows too complex becomes more difficult to clearly message, challenging to explain and defend during a ratification process, and technically harder to negotiate, verify, and monitor. More verification provisions, newer technology in the equipment lists, complex listings of limits and sub-limits, specialized definitions and jargon— all of these can ultimately jeopardize the success of an agreement once it leaves the narrow experts and enters the larger policy debate.

There are a few key benchmarks within the complexity metric. The first is clarity—how clearly can one articulate the U.S. national security objectives in the agreement? As noted earlier, with most successfully

ratified agreements the objectives can be clearly stated, regardless of the length, depth, and technical details of the agreement. Given that a future agreement will likely not result in measurable reductions (at least using the familiar counting rules and definitions in the current New START Treaty) and will involve some new measure of depth or breadth, it will be critical to identify the specific national security objectives and purpose to counter the argument of “arms control for arms control’s sake.”

The second benchmark is the negotiability of the agreement—can a complex agreement be negotiated in this geopolitical environment by an interagency group of experts within the allotted timeframe? Complexity adds a major dimension of time, which runs into the standard Russian negotiating practice of holding firm to create time pressures and U.S. concessions. Complexity also adds bureaucratic challenges to reaching compromise both within a government and across a negotiating table, as well as choosing an appropriate lead negotiator and their supporting cast of experts.

The third benchmark involves the U.S. ratification of agreement. Can a complex agreement be considered and ratified in this partisan climate by this cadre of senators and staffers?³⁴ The level of arms control expertise has diminished significantly on Capitol Hill since the ratification of the New START Treaty in 2010, partisanship has increased, and the rhetoric regarding Russia and China focuses on countering their bad behavior and negating their capabilities rather than long-term diplomacy and mutually beneficial agreements involving quiet discussion and trade space. All of this will require a clear articulation of how U.S. security objectives have been met in an agreement and a sustained education campaign both on the central elements of an agreement and the basic mechanisms of strategic arms control.

The fourth benchmark is the supporting technology required—does the technology exist to successfully implement, verify, and monitor a complex agreement? New implementation technology will be challenging to negotiate successfully, as other parties will be skeptical of how systems work and potential hidden functionality. Similarly, the more complex the agreement, the more things that need to be verified and monitored for treaty compliance. This likely means that more national technical means

34 Given the current state of Kremlin-Duma dynamics, Russian ratification is largely assumed after the Russian President’s signature on an agreement.

and other verification technologies will need to be utilized and understood. This will be key to answering the big, expected questions during negotiating and ratification related to the ability to detect militarily significant non-compliance or breakout in a timely manner and the confidence level of the Intelligence Community in their assessments related to the agreement.

Low Complexity ←————→ **High Complexity**

Clear message of U.S. deterrence objectives and an agreement's purpose		Complex or confusing message of U.S. deterrence objectives and an agreement's purpose
Level of ambition synched to allotted time and energy available		More resources or consecutive negotiations on separate complex issues
Concise message for ratification		More time and effort will need to be devoted to public messaging and preparations for ratification
Less dependence on new or advanced technology		More dependence on new or advanced technology

Cost of Agreement – The “cost” metric can be looked at in several ways. There are four types of costs that can be applied to the results of arms control: financial, political capital, the impact on armed forces, and intrusiveness and disruption. The simplest metric of cost is the cost of an agreement’s implementation as it pertains to the diplomatic engagements required to maintain the agreement, verification provisions such as the exchange of notifications and on-site inspections, and personnel resources within the interagency. This cost is often negligible in relation to overall department budgets, although savings can be realized by reducing the number of inspections and other streamlining of the implementation and verification regime.

Cost can also be viewed in terms of political capital. Successful negotiation and ratification are not assured—is it worth a U.S. government department’s or administration’s time, energy, personnel, and resources to pursue this endeavor instead of other priority missions? This is especially true when a complex negotiation with actors such as Russia and China is likely to be highly charged politically, with frequent opportunities for delay

and disruption and repeated questions about whether engaging with these regimes is a “win” or a “loss” for the United States.

Another dimension of costs is the impact on the forces. Will the agreement require force structure changes or future planning decisions in terms of changes to the anticipated program of record? Key here is whether the costs imposed on the existing or future force are seen as compensated by beneficial force structure changes or impositions on the other side or sides.

The final cost is intrusiveness and disruption of operations. Every provision in an agreement is reciprocal, thus blanket demands for newer and more intrusive verification regimes would be greater by both sides. As with other metrics, a proper balance must be struck, a level necessary to verify the requirements of the agreement. Too little disruption raises questions about the effectiveness of the verification regime; too much disruption heightens resentment within the military implementers and may undermine the durability of the agreement.

Low Cost ←————→ **High Cost**

Low costs of implementation – little impact on existing budgets		High costs of implementation – more impact on existing budgets
Low expenditure of political capital – can be done independently of other bilateral and domestic priorities		High expenditure of political capital – requires tradeoffs with other priorities
Low impact on existing and future U.S. force structure		High impact on existing and future U.S. force structure
Low level of intrusiveness and operational disruption to U.S. forces		High level of intrusiveness and operational disruption to U.S. forces

Arms Control Mindsets and Mechanisms

Setting the Stage: The Arms Control Mindsets in the United States, Russia, and China

1. United States

In the American strategic community, there are extremely diverse views of the value of nuclear arms control (broadly defined to also include nuclear disarmament and nuclear nonproliferation).³⁵ Some believe these tools do little to restrain the behavior of U.S. adversaries, while doing too much to restrain U.S. military forces and operations. Others see agreements as an effective means to promote transparency, ease military planning, limit unnecessary spending, and protect against uncertainty and surprise. Arms control and nonproliferation efforts have produced formal treaties and agreements, informal arrangements, and cooperative threat reduction and monitoring mechanisms. Despite the variety of available tools, when Congress talks about arms control, they mostly mean legally binding formal agreements which are subject to their advice and consent in the ratification process as opposed to those done simply by the executive branch through other mechanisms. In the post-Cold War era, Democratic presidents generally preferred negotiating formal bilateral and multilateral treaties to reduce nuclear forces and address proliferation challenges. In contrast, Republican presidents have usually preferred unilateral or ad hoc measures to address U.S. security concerns and emphasized the importance of maintaining maximum flexibility in force planning.

Historically for the United States, the most important use of arms control has been as a means of achieving strategic stability. As noted earlier, the U.S. approach to strategic stability is centered around crisis stability and arms race stability. Strategic stability remains in U.S. interest as a guiding

³⁵ The primers on the topic remain Thomas C. Schelling and Morton H. Halperin, *Strategy and Arms Control* (Mansfield Centre, CT: Martino, 2014) and Donald Brennan, ed., *Arms Control, Disarmament, and National Security* (New York: George Braziller, 1961).

principle in the design and operation of U.S. nuclear forces, and of other strategically consequential military capabilities, such as missile defense and long-range conventional strike systems. In the relationship with Russia, with rising uncertainty about the prospects for conflict in Europe and about the future of its strategic military capabilities, there is American interest in a long-term framework for strategic predictability and a mechanism to enhance stability in a potential crisis. In the relationship with China, the United States has a similar interest, albeit less intense in the short term. In addition to stability benefits, the United States has also used arms control treaties to improve overall bilateral or multilateral political relationships between nation-states. From the perspective of those in the United States who believe that nuclear abolition is a feasible goal, negotiating lower numbers was also seen as a concrete step towards the ultimate goal and a move closer to zero, as well as an important sign that the United States lives up to its disarmament commitment under Article VI of the NPT.

In the bilateral U.S.-Russian arms control dialogue, one of the biggest barriers is the lack of trust. The United States has detailed Russia's long and problematic track record of non- or mixed compliance with arms control agreements. Thus, many U.S. policymakers believe Russia is not a reliable partner. Russia's cheating has military implications. It has also increased the burden on a future treaty to detect—and on a future administration to punish—Russian violations. In the bilateral process it has been a longstanding U.S. demand to include nonstrategic nuclear weapons in arms control negotiations, but Russia has not been willing to engage on the issue. At the same time, the U.S. has so far rejected Russian demands to put legally binding limits on missile defense deployments, which has been the most important Russian demand of all. In most cases, one side has demands that the other cannot (or will not) meet. In addition, there are areas in which both sides acknowledge complicating factors, but there is no obvious way to deal with them. This is a particular concern for space control and cyberspace.

In general, the U.S. strategic community does not see arms control as an end in itself but as a means to ensure national security and international stability. The U.S. policy to maintain strategic nuclear forces that are “second to none” helps reassure U.S. allies that extended deterrence remains credible. Strategic arms control allows maintaining approximate parity without reigniting an arms race. For the United States, the strategic arms control

process has been important for transparency and predictability, both of which enhance stability. Transparency benefits the United States more than it does Russia, because U.S. society is inherently more open. Strategic arms control is also one way to assert compliance with Article VI of the NPT. It also helps to preserve the international non-proliferation regime. More generally, arms control is seen by some as demonstrating a commitment to an international order based on the rule of law, rather than the use of force. From a domestic perspective, arms control is also important to maintain bipartisan support in Congress for nuclear modernization.

For the United States, arms control is a continuous process of enhancing trust and predictability in which diplomacy plays a critical role. The United States requires a vision for cooperation to reduce nuclear risks in light of fears over Russian upload capacity (given its open production lines), as well as to address U.S. domestic politics and alliance commitments. In order to continue the process in the future, the United States considers it important to extend the scope of arms control both horizontally (breadth), and also vertically (depth). Vertically, there is a growing desire to include Russia's new exotic systems in the arms control framework, such as undersea drones, intercontinental-range cruise missiles, and hypersonic boost-glide vehicles. Horizontally, the United States has also indicated that it is time to involve China in the formal nuclear arms control process, and Beijing has been officially invited to join the Strategic Stability Dialogue.

2. Russia³⁶

Given the Kremlin's bureaucratic system and his own lengthy tenure in power, Putin's arms control strategy is for all intents and purposes Russia's arms control strategy. It is not pro-arms control or anti-arms control; it is instead a reflection of Putin's approach to other areas of Russian national security policy and to the bilateral relationship, with a focus on opportunism (rather than any set plan), conflict with and mistrust of the United States, and a predilection for tactical short-term gains at the expense of strategic bets on longer-term security solutions.

Russia is not interested in arms control for the sake of diplomacy or in further reductions for the sake of risk reduction or international applause. For Putin and his officials, arms control is not a cooperative process but

36 For more detail see Albertson, *Negotiating with Putin's Russia*.

another form of long-term strategic geopolitical competition with the United States. Any arms control agreement with Russia is a series of protracted competitions: the framing of the problem, the negotiations, legal conforming of the text, the legal interpretations, the implementation of the agreement itself, and the battles about implementation issues.

In arms control and strategic stability, Russian grievances or criticisms have been treasured over the decades. These threads have been woven together into a narrative that is sharpened by repetition into a few key themes. According to Russia, the main sources of instability are U.S. missile defense and conventional strike capabilities, U.S. attempts at unilateral domination, imbalances in the global system, U.S. desires for a disarming first strike, U.S. deception concerning the true target of missile defenses, and a reminder of the U.S. withdrawal from the Anti-Ballistic Missile (ABM) Treaty. According to the Russian narrative, the United States purposefully does not limit the things that are most destabilizing, therefore America must be seeking a unilateral advantage or first strike capacity. Repeating these grievances serves three purposes: first, it distracts attention from Russian actions; second, it builds a significant wall of Russian issues that would need to be addressed by any Western negotiator; and third, it reinforces the Russian narrative of itself as a long-term victim.

Since Crimea, strategic relations have worsened with the United States, and Russian paranoia has increased over U.S. preemptive actions and covert operations believed to be aimed at regime change in Moscow. In response, Russia has embarked on a modernization path that intends to achieve integrated strategic effects with a great variety of nuclear and non-nuclear tools. In Russia's view, these modernization efforts were crucial to counter the U.S. threat and be taken seriously in international affairs.

Russia has long considered strategic stability in a much broader sense than the United States. The official Russian interpretation of strategic stability—one shared by some in the United States as well—includes nuclear capabilities, conventional precision strike, missile defense, and emerging technologies in the cyber and space domains, as well as information operations and broader political factors. The Russian approach has elements of hard power and soft power, traditional military, and also political-psychological tools. Russia has worried about U.S. and NATO encirclement, and its stability concept is mainly about securing at least a predictable environment, if not a favorable one. Moscow has been seeking

restraint and arms control only in areas where it thought the United States could undermine the credibility of Russian deterrent or where it believes the U.S. has a competitive advantage.

At the same time, Putin's narrative is largely bereft of a forward concrete agenda, either on how arms control could evolve over time or a concrete proposal on resolving issues. Russia's position has effectively hardened over time and has been coupled with a sustained emphasis on nuclear modernization. As seen in Putin's speeches, Russia does not need or even necessarily want arms control and, more importantly, does not believe that it has a weak hand to play. Russians are not under the same pressures for short-term results, particularly given the relative successes of their strategic modernization program. Now on his fifth U.S. president, Putin can afford to wait out an U.S. administration or two to see if the terms of a potential agreement change in Russia's favor.

3. China

On paper, China and the United States share some broader interests in the strategic arms control and non-proliferation arena: ensuring viable international arms control, disarmament, and non-proliferation mechanisms; cooperating on regional nuclear proliferation challenges such as North Korea and Iran; countering nuclear terrorism; promoting nuclear security and peaceful uses of nuclear energy; regulating military uses of emerging technologies; and strengthening strategic stability in global, regional, and bilateral contexts. However, significant differences between the two vastly overshadow these areas of potential cooperation.

While the U.S. approach to strategic stability remains centered around crisis stability and arms race stability, China prefers a broader approach that looks at the general military balance. China seems reluctant to use the concepts of the Cold War in its strategic relationship with the United States. Although both sides accept a certain degree of mutual vulnerability in their relationship, Beijing has long been pushing for an official U.S. statement about mutual vulnerability. The U.S. refusal to do so is seen as an indication of U.S. intentions to seek absolute security. The U.S. invitations to join the Strategic Stability Dialogue have been met with confusion in Beijing since the Chinese believe that strategic stability talks are only appropriate among nuclear equals. They see these efforts

of engagement as a plot to involve China in arms control to increase its vulnerability and restrain its military modernizations.

China's experts see the responsibility to reduce arms as falling squarely on those two powers which still have 95% of the global total—the United States and Russia. They understand arms control to be a largely bilateral process involving adversaries locked in Cold War-like strategic competition—a competition China refuses to join. Action-reaction cycles may become a problem, but China refuses to be “tricked” into an arms race by the United States.

For China, transparency is not a major selling point of arms control. Chinese officials see the burden of transparency as falling on the stronger power, on the argument that the weaker power is the one more vulnerable to hidden intentions and capabilities. The responsibility to dispel uncertainties in the bilateral relationship falls on the state that is generating them (that is, the United States). They argue further that their own buildup of nuclear and missile forces and newly dominant regional posture do nothing to call into question their own rejection of new forms of transparency and restraint. “China isn’t ready,” they argue. At the same time, similarly to Russia, China is worried about U.S. advancements in missile defense and counterforce capabilities that could undermine the credibility of Chinese nuclear deterrent.

In the near future, China is highly unlikely to join formal nuclear arms control arrangements. China's opposition is deeply ingrained, and the incentives and threats necessary to overcome this opposition are either unclear or deemed excessively costly. It begins with understanding how China views the value of possessing a credible nuclear deterrent in terms of being able to stand up to nuclear bullying. It includes an assessment of the value to the United States of arms control as a tool for constraining its adversaries. It is reinforced by the notion that the United States seeks to trick China into an arms race with the ambition of prevailing in long-term strategic competition. In addition, China sees arms control as an instrument for determining a quantitative balance when the qualitative relationship is what actually matters to China.

This does not mean that China will never take on arms control obligations. It sees itself as a responsible nuclear state that exercises restraint and has not given in to the temptations of nuclear supremacy. It also does not want to be embarrassed as an outlier when and if the other four nuclear-armed,

permanent members of the U.N. Security Council can find agreement on something. But it is likely to join a formal arms control process only if and when much deeper reductions are accomplished by the United States and Russia—or when it has become comfortable enough with the state of its own forces that transparency measures will not jeopardize its security.

Potential Mechanisms: Basic Elements of the Five Proposed Arms Control Concepts

There have been numerous ideas regarding next steps in future arms control. Some have focused on building on the legacy of the legally binding U.S.-Russian agreements of the past by going deeper with Russia, expanding into new capabilities, or broadening with new participants. Others have argued that formal bilateral arms control as practiced in the Cold War and continued through the New START Treaty is a relic of the past, and thus new, less formal agreements are needed to achieve transparency and confidence-building measures in the various areas impacting bilateral and multilateral strategic stability. The most frequently mentioned arms control frameworks typically fall into the following five categories:

1. U.S.-Russian New START Treaty follow-on addressing new kinds of nuclear-armed strategic offensive arms.
2. U.S.-Russian legally binding treaty capturing all warheads deployed and non-deployed, strategic, and tactical.
3. U.S.-Russian legally binding treaty addressing broader strategic stability concerns, either by bringing in other capabilities or additional domains.
4. Multilateral legally binding or politically binding agreement (either trilateral with China, or within the P5 construct).
5. Political transparency and confidence-building measures.

These are the various forms of potential future arms control, and each will be examined in turn in light of the functions and metrics described earlier in the paper.

1. U.S.-Russian New START Treaty follow-on treaty addressing new kinds of nuclear-armed strategic offensive arms

This format would be a legally binding agreement which would look structurally much like the New START Treaty. Most of the agreed language would remain unchanged in the main treaty text, the protocol to the treaty, and the annexes to the protocol. Significant revisions would need to be made throughout the treaty, however, to 1) revise the definitions of strategic offensive arms to include new Russian nuclear-armed systems, 2) determine whether new central limits are needed in the agreement given the changed security environment, and 3) track the concomitant changes throughout the supporting inspection, notification, and data exchange provisions of the treaty.

The concept of “strategic offensive arms” would need to be expanded beyond the traditional triad of ICBMs, SLBMs, and heavy bombers. Definitions would need to be created for the new kinds of strategic offensive arms, and these systems would be counted against the treaty’s central limits (700 deployed launchers, 800 deployed and non-deployed launchers, and 1,550 deployed warheads under New START) or new central limits would need to be determined. New Type One and Type Two inspection procedures³⁷ may be required on certain new kinds of strategic offensive arms to verify the accuracy of the declared data, and new agreed statements may need to be created depending on the complexity of these issues. New facilities would need to add to the list of inspectable facilities, and new site diagrams for these facilities would be provided. These new systems would be given a unique identifier and would be subject to the biannual data exchange and the notification regime. New technologies needed for inspection of these new systems may need to be added to the equipment list.

The two sides may also wish to relitigate or update other issues that have arisen since the New START Treaty was signed in 2010. For Russia, this could mean stricter rules on removing items from accountability through conversion procedures and strengthening the language on the interrelationship between strategic offensive arms and strategic defensive arms. For the United States, this may involve stricter verification provisions on mobile ICBMs and heavy MIRVed ICBMs. Both sides would need to

³⁷ Type One and Type Two are terms of art under New START defining where inspections can be conducted and what can be seen during those inspections.

explore whether to retain the current set of limits, or whether this should be revised upward or downward to reflect the changed security environment and the expanded set of covered systems.

Depth: Low—a minor revision of New START, bilateral between Russia and United States

Breadth: Low—focused on strategic nuclear forces

Durability: High—legally binding agreement

Complexity: High—difficult ratification, criticisms of not going far enough

Cost: Low—similar to burden under New START, does not affect program of record

2. U.S.-Russian legally binding treaty capturing all warheads – deployed and non-deployed, strategic and tactical

This would be a legally binding agreement similar in structure to the New START Treaty, with an interlocking verification regime centered on unique identifiers and items of accountability tracked throughout a life cycle with a system of data exchanges, notifications, and on-site inspections. The prominent feature would be the inclusion of a defined nuclear warhead as the main item of accountability, which would likely require developing more intrusive and technical verification provisions, ensuring greater access, and understanding the complex and disparate production complexes and warhead sensitivities on both sides. The main arguments in favor of such an agreement are that it captures all U.S. and Russian warheads, addresses asymmetries in the U.S. and Russian stockpiles, and serves as a logical next step in the arms control process in moving from delivery systems to warheads.

In terms of challenges, the cornerstone of this agreement will be the definition of a “warhead” or “weapon,” as this term will determine what is and is not accountable under this treaty and how these objects are verified. The move away from very large strategic delivery systems to smaller items of accountability in warheads also presents new challenges for structuring an effective verification regime. Key questions for both sides include the number of the overall warhead cap, whether there are sub-categories of or sub-limits on certain types of warheads under the overall cap, and whether to maintain limits and accountability of strategic delivery systems.

There will also be questions about warhead verification in this future agreement. One argument is that it will be beneficial simply to have the aggregate data on total warhead stockpiles, as well as notifications of changes in status and movements. Another argument is that complex verification technology is needed to verify items of accountability, systems which could reliably confirm or challenge declared or undeclared items as nuclear warheads, along with information on their types and serial numbers. It is unclear at this time both where the bar can be set in terms of what can be negotiated between the two sides, as well as what level of verification is needed to satisfy the Intelligence Community and Congress that such an agreement can be effectively verified and monitored.

Depth: Moderate—first bilateral agreement covering all nuclear warheads

Breadth: Low—remains bilateral between Russia and United States

Durability: High—legally binding agreement

Complexity: Very High—difficult negotiation and ratification process, verification aspect

Cost: Moderate—likely increased inspection burden than under New START

3. U.S.-Russian legally binding treaty addressing broader strategic stability concerns, either by bringing in non-nuclear capabilities or additional domains

This legally binding agreement would incorporate to some degree the multiple capabilities of concern to both sides—likely some combination of nuclear, missile defense, and conventional strike. As such, it would likely need to be an amalgamation of relevant provisions from past agreements (INF, ABM, CFE, New START, SALT II) paired with newly drafted treaty language.

While a great deal of attention has been paid to the categories of potential capabilities that should be in such an agreement, the most challenging aspect of such an agreement will be the balance between how various categories of systems are treated and the trade space needed to cut asymmetric deals. Is the goal transparency of numbers and locations? Is the goal reductions and eliminations? Is the goal bans or prohibitions of categories or types of systems? Given the complexities of the issues involved, a multi-track negotiations approach could be undertaken, as was done in the 1980s.

The expansion of arms control into domains such as space and cyberspace has also been mentioned in this “grand bargain” style of agreement. In addition to the challenge of scoping the arms control objectives in these new domains, space and cyberspace would present unique problems for effective verification and monitoring of militarily significant cheating.

Depth: High—represents a significant expansion beyond current agreements

Breadth: Moderate—major new bilateral agreement between Russia and United States

Durability: Moderate—will be difficult for the treaty to keep pace with new technology

Complexity: Very High—difficult negotiation and ratification, challenge of reciprocal trades

Cost: High—could require concessions or accesses throughout the U.S. force structure

4. Multilateral political or legally binding agreement (either trilateral with China, or within the P5 construct)

Due to several factors—the expanding Chinese nuclear arsenal, the lack of progress with the Russian side on further reductions, and pressure from non-nuclear states regarding NPT Article VI commitments—some have argued that the next round of arms control must include both Russia and China. Russia in turn has argued unsuccessfully for decades that the nuclear arsenals of the United Kingdom and France should be included, given their nuclear alliance with the United States in the NATO context. The policy lines by the non-participating states have been made clearly and repeatedly. China flatly refuses to engage in future arms control, arguing that their participation only makes sense when the United States and Russia reduce their arsenals to that of China. The United Kingdom and France have also shown little willingness to participate, highlighting the reductions which they have already made since the end of the Cold War and their reluctance to be involved unless the numbers become more comparable among participants.

The central focus of such an agreement—whether political or legally binding, trilateral, or P5—would be on expanding the participants in the

process. The increased bureaucratic complexity of an agreement, coupled with the high asymmetries in nuclear arsenal size and composition, would likely mean that any agreement is unlikely to be stricter than the New START Treaty. In fact, such an agreement may be far more basic in scope and scale as new participants are eased into a strategic arms control verification regime the United States and Russia have been under for decades. A major question lies in the incentives. Little thought has gone into leverage in the way of either sticks or carrots to punish or entice these other states to participate in an intrusive arms control regime. Naming and shaming have been shown to be ineffective, and it is unlikely given the disparity in force sizes that the United States or Russia is willing to give anything of great value away in exchange for participation by one of these states.

Depth: Low—getting broader consensus likely means less depth on agreement

Breadth: High—first significant expansion beyond Russia and United States

Durability: Low—low enforceability or litigation

Complexity: High—difficult negotiating with states skeptical of arms control process

Cost: Low—likely would not be more costly or disruptive than current regime

5. Political transparency and confidence-building measures

Expected challenges regarding the two-thirds majority necessary for a legally binding treaty ratification in the United States, the steep opening demands by the United States and Russia for the next round of negotiations, and the challenges of new players, new systems, and new domains have led some to believe that the appropriate next step should be in the realm of transparency and confidence-building measures. The breadth of the arena provides for a wide variety of options, ranging from data exchanges to notifications of deployments and exercises, to political pledges on doctrine and capabilities, to agreed sets of norms in new domains. These ideas can be explored independent of what has come before in strategic arms control, which some argued has run its course with the time being ripe for new thinking and new approaches to challenges.

The central challenge here is durability. The Presidential Nuclear Initiatives of the early 1990s—the most frequently cited example of a successful transparency and confidence-building regime—were extensive but short lived,

and questions soon abounded over Russia's fulfillment of its obligations. Similarly, the concern with any agreement would be its staying power. Critics would point to U.S. withdrawal from the Joint Comprehensive Plan of Action (JCPOA) as an example of how it is impossible to make long-term political commitments with a mercurial U.S. political system. Others would point the finger at Putin and Chinese President Xi Jinping and ask whether they could be trusted to execute their commitments, and what the responses would be if they were shown to be undermining or violating their commitment.

Mainly this is an issue of setting realistic expectations. Markers put on the table demanding that Russia limit its tactical nuclear weapons or that China come to the arms control table could be poison pills rather than reasonable demands. These kinds of political agreements or confidence-building measures are unlikely to be as durable or as in depth as a legally binding agreement, but they may be all that is possible in the current U.S. political climate.

Depth: Moderate—represents a significant expansion beyond current agreements

Breadth: Moderate—major new bilateral agreement between Russia and the United States

Durability: Low—the treaty would be subject to swings in partisan and bilateral climates

Complexity: Low—should be easier to negotiate

Cost: Low—could require concessions or accesses throughout the U.S. force structure

One other option which has been mentioned is unilateral measures, either done alone by the United States in the hopes that others would follow suit or done by reciprocal unilateral measures accomplished in parallel with another country or countries. Given the lack of bilateral and multilateral arms control progress, some arms control advocates have stressed that if the United States were to take unilateral steps, Russia or China would reciprocate in kind, thus achieving the ultimate ends of formal arms control without the difficult legalistic mechanisms. These hopes are likely outdated and more suited to a 1990s or early 2000s environment where the United States had a comfortable surplus of capabilities, Russia was in dire financial and military straits, and China had a minimal deterrent force. Russia and China

have not responded to U.S. offers of restraint—either directly or indirectly communicated—and have chosen instead to embark on significant strategic modernization programs. Given their views of the comprehensive and complex nature of strategic stability, Russia and China would continue to see value in their nuclear forces regardless of U.S. unilateral nuclear steps given the assessed superiority of the United States in areas such as precision conventional strike, space, and cyber. With unilateral steps unlikely to be followed, reciprocal unilateral steps remain a possibility, albeit a complex one. Problems emerge over first-mover disadvantages, the lasting nature of such steps, and monitoring and enforceability.

Conclusion

Through this analytic process that attempts to better link deterrence and strategic stability objectives with potential arms control forms, several important conclusions should be highlighted.

Addressing specific quantitative asymmetries is the area most conducive for future arms control, but not in the areas most frequently mentioned. In terms of desired deterrence objectives and verification and monitoring of a future agreement, the debate is likely to remain about numbers, not on a single focus on lower numbers or on one-for-one trades between U.S. and Russian items (as in the past and in most discussions of the problem). On further analysis, many asymmetries are not conducive to simple trades. While focus has traditionally been on the most readily available metrics, addressing the asymmetry in the nuclear production complexes—the roots of the nuclear warhead tree—should be the issue of most concern and thus the focal point of future arms control thinking on a future agreement.

Strategic stability should be depicted as a potential benefit, rather than a stated objective, of future arms control. The United States and Russia do not necessarily share the same understanding of the term “strategic stability.” This is a challenge which can be overcome in a negotiation. The bigger challenge is in the divergence of U.S.-Russian views on the two parts of strategic stability, capabilities, and ideas. Both sides fear different capabilities the other possesses. Neither side trusts the other, given the downturn in the bilateral relationship. While “improving strategic stability” has long been a stated goal of post-Cold War era arms control, it may be losing its message as a selling point in an era of strategic competition. The value of an agreement will come from deterrence calculations regarding capabilities. Solving the problem of intentions will likely have to come not through arms control, but broader political dialogue.

Externalities could ultimately determine the fate of any U.S.-Russia arms control agreement, no matter how well-constructed or beneficial to the United States. Just as in the Cold War, even well-constructed and well-argued bilateral arms control can fall victim to externalities. SALT II's disruption by the reports of a Soviet brigade in Cuba and the Soviet invasion of Afghanistan is probably the best example. Externalities are unlikely to be adequately addressed in any future agreement. China has strongly rejected inclusion in the arms control process. Iran and North Korea remain unresolved problems. Domains like space and cyber present challenges for traditional arms control. Technology may present stability problems that outpace agreements. All of this means that more attention must be paid to the messaging surrounding arms control moving forward. For what an agreement does address, the deterrence objectives need to be clearly outlined in terms of potential benefits and value. For in regards to what an agreement does not cover or address, there needs to be a clear, defensible record of attempts to address the issue and a listing of the roadblocks and challenges.

By exploring the tradeoffs between various deterrence and national security functions, metrics add value to any analysis of future arms control. Net assessment is a tool being re-discovered and re-explored in an era of strategic competition. The attempt to apply metrics to arms control formats in this paper was rudimentary, but even this analysis provided some useful value in examining tradeoffs between various metrics and potential downsides in minimizing or maximizing various aspects of an agreement. Arms control, like most national security tools or deterrence-related competitive dimensions, would likely benefit from a more comprehensive attempt to examine metrics like depth, breadth, durability, complexity, and cost in a future agreement.

Every arms control format has its benefits and downsides—no format is an easy panacea. The application of metrics to arms control formats also shows the pros and cons of various agreements. Legally binding agreements are likely the most lasting, but only if they can be successfully negotiated and ratified. Agreements that bring in new players likely will grow more complex and thus go less deep than previous bilateral agreements. The lack of an easy answer regarding the most successful format further reinforces the point that function should come first. Deterrence objectives

will ultimately dictate the best format, and thus should be the starting point for any analysis on next steps on arms control.

If function is to dictate form, this requires decisions on specifics. What is the deterrence or national security goal the United States is attempting to address in the next round of arms control? The asymmetries are readily apparent. The challenges regarding strategic stability and externalities are understood. The next steps require determining specific deterrence objectives, studying the various arms control tools to achieve those objectives, structuring a concrete proposal on this tool, and mapping out a negotiating and messaging strategy centered on the deterrence value of the potential agreement.

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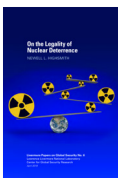
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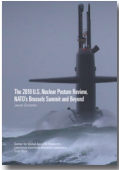


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Dr. Celeste Wallander

Former President and CEO, U.S.-Russia Foundation

““

Building on the extensive research into arms control and strategic stability previously conducted by CGSR, Mike Albertson provides a fresh analytical approach to nuclear arms control that should be read by scholar and practitioner alike. With extensive experience as a senior advisor for arms control and nuclear deterrence in the Department of Defense, the Department of State, and the National Security Council, Mike writes with the authority of one who has been there, done that. No doubt directed to policymakers, the study cautions that if arms control is to survive as a national security tool, it will be necessary to understand its capability and limitations in achieving U.S. deterrence and strategic stability goals that, in turn, must be understood and agreed upon. Arms control negotiations, though made more difficult by the factors addressed in this report, will continue to be a feature of U.S. nuclear policy. This arms control handbook provides a useful guide for how to get on with it.””

Dr. Robert Soofer

*Senior Associate (non-resident), Center for Strategic and International Studies (CSIS)
Adjunct Professor, Center for Security Studies (CSS), Georgetown University*

““

Mike Albertson's new monograph is an important contribution to the literature. A useful corrective to the widespread tendency to assume that more arms control is necessary per se—or to fixate upon numerical limits without a clear understanding of what those limits contribute to stability—Albertson wisely directs us to think carefully through important antecedent questions about what problems we aim to solve with arms control, how to judge an agreement's contribution to such solutions, and only then to think we can tell what form it should take. His new study is a thoughtful call for arms control focused upon a clear sense of its intended purpose and an awareness of its ability to contribute to specific security objectives. It is informed by an awareness of linkages between arms control challenges and emergent strategic stability problems in multiple conflict domains. A valuable work.””

Dr. Christopher Ford

*Distinguished Policy Advisor, MITRE Labs
Visiting Fellow, Hoover Institution, Stanford University*