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RUSSIA'S NEW NUCLEAR WEAPON DELIVERY SYSTEMS

Implications for New START, Future Arms Control, and Strategic Stability

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SUMMARY

President Vladimir Putin's disclosure of Russia's development of several new nuclear weapon delivery systems has raised questions about their implications for global security, strategic stability, and arms control. In the United States, there is particular interest in the implications of the Russian systems for the ongoing debate about whether to extend the 2011 New Strategic Arms Reduction Treaty (New START).

Drawing on the technical assessment in "Russia's New Nuclear Weapon Delivery Systems: An Open-Source Technical Review," a new report by Dr. Jill Hruby, the inaugural Sam Nunn Distinguished Fellow at the Nuclear Threat Initiative (NTI), this paper concludes that extending New START would ensure that significant new Russian systems would be subject to limits and verification, and would provide a forum for discussing the other strategic systems that are further away in time from deployment.

Beyond New START, leaders must consider the implications of global advancements in nuclear and conventional weapon systems and technologies for strategic stability. This paper sets forth a framework with key questions and considerations for more in-depth analysis. As new technologies and weapon systems open the door to a new arms race, leaders must reengage and renew dialogue to address potentially catastrophic risks and consider new means to reduce nuclear competition and renew strategic stability. As Hruby's report makes clear, there is urgency to do so.

Key conclusions include:

- ▶ Extending New START until February 2026 would preserve numerical limits on and verification of Russian strategic systems, including the two new ones expected to be deployed before 2026 (the Sarmat intercontinental ballistic missile and the Avangard hypersonic boost-glide vehicle,

deployed on ICBMs), and would buy time for negotiations on other “new kinds” of strategic systems, which, Hruby’s paper assesses, are not likely to be deployed before 2026.

- ▶ While the extension of New START would provide near-term predictability and transparency, the development of new kinds of strategic weapons—by Russia and, potentially, other countries—will require new approaches over the longer term. Future arms control agreements should address strategic-range systems that may not fit the types and categories covered by New START and its predecessors, as well as potentially sub-strategic-range nuclear delivery vehicles and/or nuclear weapons themselves.
- ▶ The emergence of new technologies and weapons—including Russia’s novel systems as well as hypersonic delivery vehicles of various ranges being developed by the United States, Russia, China, and other countries—will require new approaches to strategic stability that address increasingly complex factors, including new nuclear and conventional systems and technologies and the blurring of lines between nuclear and conventional capabilities; cyber capabilities; artificial intelligence; and the relationship between offensive and defensive capabilities. These challenges will be the subject of ongoing study at NTI over the coming months.
- ▶ China is on the leading edge in development of new technologies and capabilities—including hypersonic delivery vehicles, artificial intelligence, and cyber, in addition to its significant but still relatively small nuclear arsenal—making it increasingly important for the United States to engage Beijing in discussions of strategic stability and lay the groundwork for future negotiations.

▶ As detailed in *The Return of Doomsday: The New Nuclear Arms Race—and How Washington and Moscow Can Stop It*, a September 2019 *Foreign Affairs* article by NTI Co-Chairs Ernest J. Moniz and Sam Nunn, this increasing complexity and uncertainty come at an especially dangerous moment, when relations among world powers—in particular between the United States and Russia—are increasingly unstable and dialogue aimed at reducing risks is at a historic low point. As Moniz and Nunn conclude, a return to meaningful dialogue is an increasingly urgent necessity.¹

INTRODUCTION

President Putin’s public disclosure in recent years of Russian activities related to the development of six new weapons-delivery systems, five of which are stated by Russia to be nuclear-capable, has prompted global interest in understanding the systems’ purpose, the state of their development, and their implications for strategic stability and arms control. Jill Hruby has published a comprehensive open-source technical review of these weapon systems, titled *Russia’s New Nuclear Weapon Delivery Systems: An Open-Source Technical Review*.² As a companion to Hruby’s piece, this paper examines some of the arms control and potential strategic stability implications of the Russian systems.

Specifically, Hruby’s paper examines six systems: the Sarmat ICBM; the Avangard hypersonic boost-glide vehicle; the Kinzhal air-launched, intermediate-range missile; the Tsirkon hypersonic cruise missile; the Poseidon nuclear-powered, strategic-range torpedo; and the Burevestnik nuclear-powered, strategic-range cruise missile. This paper draws on the technical analysis in Hruby’s paper to consider whether and how New START—or future arms control agreements—might apply to these six systems.

¹ Ernest J. Moniz and Sam Nunn. “The Return of Doomsday: The New Nuclear Arms Race—and How Washington and Moscow Can Stop It,” *Foreign Affairs* 98, no. 5, (September/October 2019), www.foreignaffairs.com/articles/russian-federation/2019-08-06/return-doomsday.

² Jill Hruby, *Russia’s New Nuclear Weapon Delivery Systems: An Open-Source Technical Review*, Nuclear Threat Initiative, October 2019, www.nti.org/Russias-New-Nuclear-Weapons-Delivery-Systems.

The paper also highlights broader questions that can help shape an analytical framework for future work—by NTI and others—on the strategic stability implications of these systems and other new technologies being pursued by not only Russia, but also the United States, China, and others.

APPLICABILITY OF NEW START TO THE NEW RUSSIAN SYSTEMS

The New START Treaty³ limits Russian and U.S. strategic offensive arms and requires extensive and intrusive verification measures. The limits, knowledge, predictability, and inspection regime the treaty provides regarding Russian and U.S. strategic nuclear forces are critical to helping avoid worst-case military planning and unconstrained nuclear competition. The treaty will expire on February 4, 2021, unless the United States and Russia take advantage of the provision that allows them, by mutual agreement, to extend it for up to five additional years. Russia has repeatedly expressed interest in extending the treaty—although noting some concerns about U.S. implementation—but U.S. officials have thus far been noncommittal about extension, citing, among other factors, Russia's development of novel nuclear systems.

As the 2021 expiration date draws closer, there has been considerable debate among experts and in Congress regarding the merits of extension. Some who oppose it claim that the treaty should not be extended, because it does not address these nascent Russian capabilities. However, this rationale does not stand up to analysis: it is false with regard to two of the systems and misleading or not germane regarding the others. In fact, as the following discussion demonstrates, preserving and extending New START is an

important near-term step to preserve limits on the strategic-range systems expected to be deployed by 2026 and to provide a forum for discussing the strategic systems that may be deployed over the longer term.

Below is a brief discussion of how New START would or would not apply to each of the six Russian weapon systems covered in Hruby's paper.

Sarmat

The Sarmat meets New START's definition of an ICBM and therefore would be fully accountable under the treaty's central limits on delivery vehicles. The warheads carried on the missile would similarly be accountable, under the treaty limit of 1,550 deployed warheads. Hruby's paper estimates that the Sarmat is likely to begin deployment in 2022, with deployment complete by 2027.

Avangard

New START does not address hypersonic glide vehicles. However, because Russia is planning to deploy the Avangard vehicles on ICBMs—initially the SS-19, later the Sarmat—those Avangard vehicles deployed on ICBMs would be accountable under the New START limit of 1,550 deployed warheads. Hruby's paper estimates the Avangard could be deployed as early as 2022 if Russia makes a substantial investment in its continued development and testing.

Kinzhal

The Kinzhal—an air-launched, intermediate-range missile—would be accountable under New START only if it were deployed on an aircraft that met the treaty's definition of a “heavy

³ The New START Treaty between the United States and Russia entered into force on February 5, 2011. It has a duration of 10 years but by its own terms could be extended for up to five years. Thus, it will expire on February 4, 2021, unless the parties agree to extend it. New START limits the United States and Russia each to a total of 1,550 deployed warheads, with sub-limits of 700 combined deployed ICBMs, submarine-launched ballistic missiles (SLBMs), and heavy bombers equipped for nuclear armaments, and 800 combined deployed and non-deployed ICBM launchers, SLBM launchers, and heavy bombers equipped for nuclear armaments. It includes robust verification and transparency measures to allow each side to verify the other is complying with the Treaty, including up to 18 annual on-site inspections per side each year and the required exchange of frequent and numerous notifications regarding the location and movement of treaty-limited items.

bomber.”⁴ However, the anticipated delivery system for the Kinzhal—the MiG-31K fighter bomber—is not counted as a heavy bomber under New START; estimates of its range vary, but they are well below the treaty’s 8,000-km threshold.⁵ Therefore, the Kinzhal deployed on a MiG-31K would not be accountable under New START. Given its limited range, the Kinzhal is not the type of nuclear system New START was intended to address, just as U.S. tactical fighters such as the F-15 and F-35 and their associated nuclear-weapon systems are not covered by the treaty.

Tsirkon

Given its estimated range—approximately 500 km—and its current characterization as a conventional system, this hypersonic cruise missile is clearly not accountable under New START, nor is it the type of system the treaty was intended to address. Reporting indicates the Tsirkon is primarily envisioned as a sea-launched cruise missile, with some reports suggesting that a lighter air-launched version may also be envisioned. In any case, it is highly unlikely to be deployed before the mid- to late 2020s.

Poseidon

The Poseidon nuclear-powered, nuclear-tipped torpedo does not fall under any of the definitions of strategic offensive arms limited by New START. Given its strategic range, the system seems ripe for discussion under Article V, paragraph 2 of the treaty, which states: “When a party believes that a new kind of strategic offensive arm is emerging, that Party shall have the right to raise the question of such a strategic offensive arm for consideration in the Bilateral Consultative Commission” (BCC), the treaty’s implementing body. Whether and how the treaty

should apply to any “new kind” would have to be mutually agreed by the United States and Russia, though Poseidon’s estimated deployment timeline of 2027 or later means New START—even if extended—would no longer be in force. The availability of the BCC as a forum for discussing such concerns is in fact an argument for maintaining the treaty in force through 2026. It is a venue that both sides have already agreed to use for precisely the type of questions and concerns raised by new kinds of strategic offensive arms, such as Poseidon, and it would be lost if New START were to be allowed to expire in 2021.

Burevestnik

Like the Poseidon, the Burevestnik—a nuclear-powered, nuclear-armed strategic-range subsonic cruise missile—does not fall under any of the definitions of strategic offensive arms limited by New START. Also like the Poseidon, it would be ripe for discussion in the BCC as a new kind of strategic offensive arm. (Its range, in theory, could be 23,000 km or more, due to its nuclear-powered propulsion system.) That said, as Hruby’s paper makes clear, it is extremely unlikely that this system would be deployed before 2026, if ever, given the technical obstacles facing its development and deployment.

IMPLICATIONS FOR NEW START EXTENSION AND FUTURE ARMS CONTROL MEASURES

In the near term, extending New START is the best available means to address these new Russian systems: to ensure limitations on the two strategic systems that Russia could most plausibly deploy by 2026 (the Sarmat ICBM and the Avangard hypersonic missile deployed on

⁴ Under the treaty, each deployed heavy bomber has an attribution of one deployed warhead. New START defines a “heavy bomber” as a bomber that either has a range “greater than 8,000 kilometers” or is “equipped for long-range nuclear ALCMs,” meaning nuclear-armed, air-launched cruise missiles with a range greater than 600 km. The Kinzhal is not an ALCM, and its range is not expected to exceed 600 km.

⁵ There is speculation that the Kinzhal also could be carried on the upgraded Tu-22M3 bomber; estimates of this aircraft’s range vary, but some are as high as 7,000 km. Were the upgraded version of the Tu-22M3 to have a range meeting the 8,000-km threshold, then it could be accountable as a heavy bomber under New START. However, there is no evidence at this time that the Tu-22M3 will have strategic range or that modifications to carry the Kinzhal are planned.

ICBMs); to preserve the treaty's BCC as a forum for discussing the new kinds of strategic offensive arms Russia is exploring; and to allow time for the United States and Russia to negotiate new agreements that could address new kinds and types of systems in the future.

The development of hypersonic capabilities by Russia, China, and the United States—and likely by other countries over time—and Russia's development of novel delivery vehicles such as Poseidon and Burevestnik raise new questions about strategic stability and how arms control can best contribute to stability moving forward. At a minimum, future strategic arms control agreements should be negotiated to cover new kinds of strategic offensive arms that may come into existence. Beyond that, it will be important to consider whether and how to take into account nuclear delivery systems of all ranges, nuclear warheads themselves, and other countries with nuclear weapons beyond Russia and the United States, including but not limited to China.

A FRAMEWORK FOR ASSESSING IMPACT ON STRATEGIC STABILITY: QUESTIONS FOR FURTHER CONSIDERATION

It is critical that the United States and Russia—and other countries with nuclear weapons—engage in serious discussions of strategic stability and how it is affected by the development and deployment of new types of weapon systems and technologies, including nuclear and conventional prompt-strike and hypersonic delivery vehicles, and other capabilities such as missile defense, cyber, and artificial intelligence.

Strategic stability dialogue must take into account not only advances in technology and weaponry but also the ways in which they interact with each other and the action–reaction dynamic and arms competitions they stimulate. Such dialogue must have a broad focus and purpose. One, but not the sole, element to consider is whether and how future arms control

or other cooperative measures might help limit the development and deployment of weapon systems, technologies, and force postures that undermine mutual security, fuel nuclear-arms competition, and increase the risk of nuclear use.

These issues are extraordinarily challenging for governments to grapple with, all the more so for the United States and Russia now, at a time when relations are strained and dialogue is insufficient given the urgency and complexity of the problems. Outside experts can contribute by analyzing the issues and developing policy ideas for governments to consider.

The questions raised by this paper fall into four broad, interrelated topics that, combined with additional questions related to technological developments in areas such as cyber, artificial intelligence, and outer space, provide an initial framework for further work and analysis. All of these factors will need to be considered in future analyses of strategic stability.

Hypersonic Weapon Systems

Given the advanced state of work and intensifying interest in hypersonic weapons in Russia, the United States, and China, consideration of the impact of these systems on strategic stability is particularly urgent. Such analysis—and future discussions about how to manage the potential impact—is complicated by the differing approaches among the three countries as to whether hypersonic systems are intended to carry nuclear or conventional warheads and by the fact that even conventionally-armed hypersonic weapons could have strategic impact. China's heavy investment and its advanced development of hypersonic capabilities make it a potential peer of the United States and Russia in this area, raising the question of whether and when discussions—and potential agreements—about hypersonic systems should expand beyond a bilateral U.S.–Russia format to include China. Additional key questions include:

- ▶ Do the speed, maneuverability, and difficulty of detection by Earth-based sensors of

hypersonic weapons (given their low flight altitudes) make them uniquely destabilizing? Is the answer affected by whether they are nuclear or conventionally armed? Do they pose a unique discrimination problem? How does their impact differ from that of ICBMs, which can reach their targets just as quickly?

- ▶ Do hypersonic systems exacerbate the problem of decision time in a crisis?
- ▶ Will sub-strategic-range hypersonic weapons, particularly if nuclear-capable, have a significant effect on strategic stability?
- ▶ If the impact of hypersonic weapons is unique or especially destabilizing compared with that of other capabilities, should countries consider limitations on them? Should such limitations focus on how they are armed (nuclear or conventional) and/or their range and deployment locations?
- ▶ Is there a potential for conventional hypersonic weapons to enable reduced reliance on nuclear weapons by fulfilling military missions previously thought to require nuclear-armed systems?
- ▶ Will hypersonic systems make nuclear deterrence more or less viable or stable?

New Kinds of Strategic Offensive Systems

Russia's development of new kinds of strategic capabilities, such as Poseidon and Burevestnik, presents a challenge to the traditional way of thinking about, categorizing, and potentially limiting strategic nuclear systems. Additional analysis is needed to consider the strategic-stability and arms-control implications of these two systems—and of other systems that could emerge in the future. Questions include:

- ▶ Would the impact on strategic stability of systems such as Poseidon and Burevestnik differ substantially from that of Russia's existing capabilities provided by ICBMs, submarine-launched ballistic missiles (SLBMs), and heavy bombers? Would

such systems bolster nuclear deterrence or undermine it?

- ▶ What impact could or should Russian development of such systems have on modernization plans in the United States and other countries and/or on future research and development—and, as a result, on the potential for a destabilizing arms race?
- ▶ Should all new kinds of strategic-range nuclear arms be subject to and limited by future nuclear arms control agreements? Are any of them so potentially destabilizing (or dangerous for other reasons, including the risk of accidents involving dispersal of nuclear materials and radiation) that negotiations should aim to ban them?

Role of Nuclear Arms Control and Cooperative Arrangements in the Future

The looming expiration of New START—whether in 2021 or 2026—and the demise of the Intermediate-Range Nuclear Forces (INF) Treaty, combined with the increasingly complex strategic and technological landscape, raise important questions about the future contribution of arms control and other cooperative means to reduce nuclear risks, constrain nuclear competition, and renew strategic stability. Relevant questions include:

- ▶ Assuming an assured second-strike capability is still important to strategic stability, which systems and force postures bolster or erode it?
- ▶ Should future strategic nuclear arms control agreements be crafted to encourage the parties to adopt more stabilizing force structures? Rather than putting a premium on each side's "freedom to mix," should we be discouraging, for instance, Russia's return to heavy ICBMs with Multiple Independently-targetable Reentry Vehicles (MIRVs) or both sides' retention of vulnerable "use it or lose it" systems?
- ▶ Is the Poseidon a second-strike system that enhances stability by reinforcing the condition

of mutual vulnerability, or is it a troubling first-strike decapitation system?

- ▶ Should sub-strategic-range nuclear-capable delivery vehicles be subject to future arms-control agreements, particularly given the demise of the INF Treaty?
- ▶ Would it be stabilizing for the United States and Russia to move non-strategic nuclear weapons away from the European theater?
- ▶ Should future nuclear-arms-control agreements focus on limiting the deployment of and eliminating actual nuclear warheads, in addition to—or instead of—limiting their delivery vehicles?
- ▶ At what point is it realistic to bring China, and other countries with nuclear weapons, into new nuclear agreements along with the United States and Russia?

The Offense–Defense Relationship

Revisiting the relationship between offensive nuclear forces and defensive capabilities as a factor in nuclear competition is overdue. Russia has made clear that its development of the new delivery systems addressed in Hruby's paper is a response to the U.S. withdrawal from the Anti-Ballistic Missile (ABM) Treaty in 2002 and the continuing development and deployment of U.S. missile defense capabilities. Russia has long expressed concern that U.S. missile defenses could pose a threat to Russia's strategic deterrent, and Russian descriptions of all six of these systems are largely focused on their purported invulnerability to existing and potential future defensive measures.

At the same time, U.S. official policy has long held that missile defense is not intended to undermine Russia's strategic deterrent and that the United States recognizes the condition of mutual vulnerability vis-à-vis Russia's nuclear forces. In theory, Russia's development of capabilities intended to defeat U.S. missile defenses and thereby assure its second-strike capability need not be viewed as inherently destabilizing. Yet in reality, the United States

expresses concern about the new capabilities Russia is developing.

The action–reaction dynamic between offensive and defensive capabilities cannot be ignored indefinitely. The systems Russia has developed to ensure that its offensive capabilities remain capable of overcoming U.S. defenses are now fueling alarm and, likely, the pursuit of additional offensive and defensive military capabilities by the United States and other countries. This destabilizing pattern will continue until the United States and Russia address the underlying factors that motivate this negative dynamic. Questions for consideration include:

- ▶ During the Cold War, strategic stability between the United States and Russia was largely premised on the acceptance of mutual vulnerability; does that premise hold true today? Does it apply with respect to China as well?
- ▶ Why is Russia so concerned about the viability of its strategic deterrent given the large number of nuclear systems it has?
- ▶ Would changes to U.S. missile defense policy lead Russia to reconsider the development and deployment of some of its novel nuclear systems, given that defeating missile defenses has been the consistent, long-standing rationale for their development?
- ▶ Are the Russian systems so concerning to the United States that policymakers should reexamine long-held opposition to restraints on missile defense? Are there transparency and cooperative measures that could mitigate Russian concerns?
- ▶ Given Russia's assertions that these systems are a response to missile defense, how should the offense–defense relationship be addressed in strategic stability discussions and, potentially, as the United States and Russia consider future nuclear agreements?

Space, Cyber, and Artificial Intelligence

Beyond the questions that arise directly from consideration of the new Russian nuclear systems, there are a host of broader and urgent issues to examine. One is the increasing militarization of space and the risk that poses to critical assets in space and on Earth. Another is the blurring of the line between conventional and nuclear capabilities and assets, and the risk that may pose for miscalculation in peacetime and in war. The potential cyber risks to nuclear command and control and warning systems,⁶ and the question of how the potential applications of artificial intelligence could mitigate or exacerbate nuclear risks, also must be urgently addressed. This is not to suggest that advances in technology are inherently dangerous or destabilizing. To the contrary, it is critical to examine how the risks of technological advances can be mitigated and their benefits realized, particularly when it comes to avoiding the existential threat of nuclear war.

These questions and others regarding the impact of new nuclear and conventional weapons systems and technologies on strategic stability, deterrence, and the future of arms control will be the subject of ongoing study at NTI over the coming months.

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⁶ Page O. Stoutland and Samantha Pitts-Kiefer, "Nuclear Weapons in the New Cyber Age, Nuclear Threat Initiative, September 2018, www.nti.org/analysis/reports/nuclear-weapons-cyber-age/