



Rethinking Nuclear Arms Control

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Rethinking Nuclear Arms Control

Where is nuclear arms control—negotiated restraints on the deadliest weapons of mass destruction—headed? This 50-year tool of US national security policy is currently under attack. The New Strategic Arms Reduction Treaty (New START), the last remaining nuclear arms agreement with the Russian Federation, will go out of force in February 2021 unless it is extended for an additional five years as the treaty permits. At this moment, nothing is on the horizon to replace it, though the Trump administration has promised a new and more extensive agreement that includes China as well as Russia. The negotiators have scant time to finish such a treaty before New START ends.

Nuclear arms control is not “dead,” however, contrary to what is fashionable to proclaim these days. Humankind is now used to negotiated restraint, if only as a way to avoid building up arms that do not defend people and their interests on a day-to-day basis. If we overspend on nuclear weapons, then we underspend on other systems—not just conventional weapons, but also the intelligence, reconnaissance, surveillance, communications, and command-and-control systems needed to make our defenses effective every day. Budget and opportunity costs are at the heart of the rationale.

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At the same time, nuclear arms control activities should only be engaged if they are in the national interest. Sometimes advocates get sloppy and treat arms control as a natural good or as a goal in and of itself. Every negotiation must begin with the basic question: can we seek, and will we find, a nuclear arms control outcome that is in the interest of national security? So far, I believe that we have and that we will in future.

Skepticism about Nuclear Arms Control

But if arms control is not dead, why are there so many headwinds right now? Why are we down to one nuclear arms control treaty, with none waiting in the wings? And why are we facing unrelenting attacks on the very idea of negotiations?

Partisanship in US Nuclear Arms Control

One major reason for this lack of progress is the history. In the United States, nuclear arms control has always been controversial in some quarters, cleaving the community into hawks and doves. Support for arms control policy did not always see Republicans and Democrats on opposite sides of a strict divide; today, Republicans stand against it, and Democrats stand for it. When I first got into the business in the 1970s, the strongest hawks on arms control policy were often prominent *Democratic* politicians. The best example in my mind is Henry M. “Scoop” Jackson, who was the founder of the neoconservatives before they switched parties. As Elliott Abrams wrote, “Jackson was a traditional Democrat: liberal on domestic policy, strongly tied to the labor movement, and a hawk on national security matters. ... In the 1970s and 1980s there were many of us Jackson Democrats and many references to the ‘Jackson wing’ of the party. The meaning was clear: Democrats who cared deeply about defense issues were hawks. They believed in military superiority for the United States and supported big defense budgets.”¹

For the early proponents of arms control in the Nixon administration, during the so-called first *détente* with the Soviet Union, the Jackson Democrats were a scourge—constantly skeptical, relentlessly critical, and always asking the toughest questions. And yet, Henry Jackson and his allies opposed arms control with intellectual rigor and a great deal of interest, knowledge, understanding, and pragmatism—or what Jackson liked to call “prudence.”² If they opposed an arms control policy, it was because they understood the issues well and had good reason to say no. They were also capable of saying yes, but they imposed their own precise caveats in doing so. When the Strategic Arms Limitation Talks (SALT) I Interim Agreement and the Anti-Ballistic Missile Treaty (ABMT) went before

the Senate in 1972, Jackson voted in favor, but he also created an amendment, a “sense of the Senate,” to steer their implementation to his exacting standards.³

There are many reasons why bipartisanship in arms control policy has faltered nowadays—some of it has to do with our deep national polarization, and some of it is an attention span problem as other issues dominate the national stage. However, lack of knowledge of, or interest in, the issues means that legislators on both sides of the aisle are not as equipped as they could be to fulfill their constitutional role of giving advice and consenting to the ratification of arms control treaties. Not feeling invested in the issues, they tend to vote on party lines.

There are many reasons why bipartisanship in arms control policy has faltered nowadays

Russian Compliance Record

Another major reason for skepticism about arms control is the Russian compliance record. Over the past 15 years, as President Putin has developed more and more antipathy toward the United States and its allies, he seems to have empowered cheating in the Russian system. In 2007, Russia advised that its government had decided to stop implementing the Conventional Forces in Europe (CFE) Treaty. Over the next decade, Russia raised more and more barriers to the implementation of the rest of the conventional arms control regime, both in the Vienna Document confidence-building measures and the Open Skies Treaty.

The most egregious barrier, however, was Russia’s violation of the Intermediate-Range Nuclear Forces (INF) Treaty. In 2011, the United States determined that Russia had flight-tested a ground-launched intermediate-range cruise missile called the 9M729. I was among the US diplomats who spent the rest of the decade trying to convince the Russians to come back into compliance with the treaty. The Russians have never acknowledged the missiles’ intermediate range and have kept deploying them in their European and Asian regions.

In 2019, the United States, with the full cooperation of its allies both in Europe and Asia, declared Russia in material breach of the treaty and notified its intent to withdraw. There was hope, particularly among US allies, that Russia and the United States would be able to successfully negotiate the issue and that Russia would come back into compliance. This hope was not borne out, however, and the United States withdrew from the INF in August 2019.

This poor compliance record colors a lot of US opinion about Russia’s reliability as an arms control treaty party. If it cannot comply with every treaty, then why should the United States trust it with any treaty? The answer to that question is to keep a sharp eye on compliance, which the United States does through an official process that involves scrutiny of Russia’s implementation record (how well do

they cooperate with monitoring procedures?) as well as the full weight and knowledge of the intelligence community. By law, this compliance assessment is issued annually on April 15.⁴

The United States has repeatedly declared that Russia is in full compliance with New START, including in the most recent report.⁵ So far, it can be confident that Russia is not violating the treaty. That frees the United States to return to the basic question: is New START in the US national security interest? In my view, the answer is a resounding yes, because New START prevents a rapid Russian build-up of nuclear warheads and missiles, giving the United States the predictability that it needs in order to modernize its nuclear

arsenal over the next decade.⁶ The Russians cannot outrun us while we are rebuilding our nuclear forces.

In sum, the Russians *are* capable of complying with a treaty such as New START. We need to keep a careful eye on compliance behavior throughout the life of any treaty—Ronald Reagan’s adage to trust but verify—but bad behavior in one setting does not necessarily spell bad behavior in all settings.

Rebuilding Consensus

These two negative factors fit together: those who are skeptical of arms control see any Russian noncompliance as proof that arms control as a whole is simply not a worthwhile policy tool. Add to that the partisan nature of the divide, and we have seen over the past two decades a whipsaw effect in our national approach: when the Democrats are in power, they do what they can to build up arms control regimes; when the Republicans are in power, they do what they can to dismantle them.

This instability need not be the case, however. In the 2010 ratification process for New START, a healthy bipartisan debate emerged. Although some senators reflexively opposed this arms control agreement, many senators from both sides of the aisle treated the issue seriously and considered deeply the national security pros and cons of giving President Obama their advice and consent to ratification.

Longtime experts who worked with me on the delegation mourned that New START did not attract the wide-ranging consensus that earlier treaties had. By contrast, START attracted 93 votes when the Senate passed it in 1992. However, the difficulty of the debate is evidence of a serious discussion. With ample time to ask questions and dispute the matter, the senators were able to develop solid reasons to support the treaty, resulting in 71 votes, more than the 67 needed to win ratification. The victory was hard-won, but worth it.

Nowadays, the emphasis must be on rebuilding enough bipartisan consensus to be able to continue to function in this policy arena. US global leadership is generally in doubt; we could at least partially restore it through attention to the issue. Responsible nuclear arms control behavior is an enormous international confidence-builder, creating a sense of predictability and stability to temper nuclear dangers. Up to this point, the United States has always been a leader in this arena.

But there are other big stakes: US leadership on nuclear arms control policy has also underpinned the success of the Non-Proliferation Treaty (NPT) regime, wherein five states have kept their nuclear weapons while much of the rest of the world has eschewed them. Only a few exceptions have emerged—India and Pakistan have stayed outside the NPT and developed their arsenals; North Korea and Iran, the “bad boys” of the regime, have pursued illicit programs. Israel, too, has stayed out of the NPT regime, but it has never given the reason why.

If US support for nuclear arms control totally collapses, then the NPT is also in danger of collapse. Should that be the case, the United States as well as the rest of the world could see a resurgence of nuclear weapons programs in many states. At the time the NPT was signed in 1968, European countries as diverse as Sweden, Germany, Italy, and Switzerland were pursuing nuclear weapons. John F. Kennedy said in a presidential debate in 1960 that as many as 20 nuclear weapons states could emerge by 1964—the profound opposite of nuclear stability and predictability.⁷

Deep skeptics of nuclear arms control will continue to be part of the American political scene—they are part of a proud historical tradition, and it cannot be otherwise. At the same time, enough politicians and their constituents will fail to see the logic in threatening to spend our erstwhile opponents into the ground by buying new nuclear weapon systems. Too many priorities will demand attention in the non-nuclear part of the defense budget and in the national budget overall, especially as the world faces an economic crisis in the wake of COVID-19. Of course, judicious modernization of the US nuclear force structure is already underway, with bipartisan support. It should continue.

My recipe for rebuilding bipartisan support is to take the same approach that we took when seeking the advice and consent of the Senate to ratify New START: spend time and answer every question, making clear the interests of the United States in the matter. The treaty must serve US national security interests, or it will lose the argument.

**In the near-term,
we need to move
quickly and keep it
simple**

The Near-Term Way Forward

In the near-term, we need to move quickly and keep it simple. The reason is direct: we need some immediate wins to restore confidence in the arms control tool, but

more importantly, we need it to reestablish US leadership in this as in other realms of policy. Of course, the United States should be pushing to do so on multiple fronts: in climate change and the environment; in trade, finance, and commerce; in science and technology; and in international governance. But in the nuclear arms control arena, as long as we prepare ourselves to move quickly and do not overthink the problem, there is potential for immediate wins. I see three distinct near-term phases: extending New START, reducing existing nuclear weapons, and incentivizing China to participate.

Extending New START

The first and most obvious step is to extend New START, which goes out of force in February 2021 unless it is extended for five years. Many have argued that doing so will give time and opportunity to pursue more ambitious arms control goals, such as limiting all nuclear warheads and bringing China into a new agreement.⁸

An additional benefit, however, would be the immediate gain in global confidence as the United States shows itself ready to engage again in a direct way, without delay and obfuscation, in this area of policy. The Trump administration, although it speaks of arms control as an important goal, has done little to deliver on its policy in the past four years. Constant delays in scheduling talks with the Russians and the abstract discussion those talks yielded (rather than concrete treaty negotiations) conveyed the message that the administration has no intention to achieve arms control goals. A quick extension of New START would show the world that the United States is back in the game.

In addition to showing that the United States is again willing to play, a collateral benefit would be, as I note above, to restore energy to the NPT regime. The 2020 Review Conference, which was supposed to be a celebration of the 50th anniversary of the NPT in May, was delayed because of the COVID-19 pandemic. Many, however, believed that it was headed for disaster, since the United States was insisting that disarmament was essentially over and would not permit a wide-ranging assessment of that pillar of the treaty.⁹ The NPT's 50th anniversary could have been its last, but a signal that the United States is returning to its goals could spell perhaps new momentum behind the treaty and, at worst, a reprieve from disaster.¹⁰

The goal of New START extension is straightforward to achieve, through a simple exchange of diplomatic notes. Currently, Russian experts are saying that they require a legislative process to extend the treaty, which involves consideration by both the lower and upper houses: the Duma and the Federation Council.¹¹ However, Russian legislative bodies have been known to move quickly when a matter is considered in the clear national security interest of the Russian Federation. Russian political figures, including President Putin himself,

have conveyed that New START is the gold standard for treaties of its kind and should be extended without preconditions.¹²

The Trump administration has proposed that the treaty be extended not for five years, but for a shorter period of time, in order to exert pressure on the Russians to negotiate and on the Chinese to come to the table. I have severe doubts that pressure can be achieved on either count. The Russians are masters at maneuvering leverage and will ensure that most of the year spent negotiating will be lost in argument over who is responsible for not getting to “yes.” The Chinese have evinced no interest in the negotiations. For them, New START is strictly a bilateral US-Russian affair, and they know that its demise cannot be pinned on them.

A full five-year extension does not mean that Washington and Moscow would be stuck with the treaty for five years. The treaty was written to say that it can be extended for five years, or until superseded by a new treaty. With a five-year extension, the parties can shift into intensive negotiations and state a political intention to finish the negotiations within a short period of time—a year or two. If stated at the presidential level, these marching orders will have a more powerful effect on getting the negotiations done than the procedural move of a short-term extension.

Thus, a simple extension of New START for five years would be the first easily achieved win. It would signal that the United States is back in the game, create a stable environment for negotiation of more ambitious agreements, stabilize the NPT regime, and ensure that US nuclear force modernization can go forward in a predictable way, without worry about rapid Russian build-up above the New START levels of warheads and missiles.

Reducing Existing Nuclear Weapons

What next? The Trump administration has argued for a new treaty that limits all nuclear warheads, including non-deployed nuclear warheads held in storage facilities. This limitation is a worthy goal, although it is more ambitious than anything ever achieved at the negotiating table. Past treaties focused on constraining the delivery vehicles for warheads (sea- and ground-launched missiles) and their launcher systems (such as mobile transporters, submarines, and bombers) because these are large pieces of hardware that even satellites in space can easily count. Warheads, once they came off the missiles, were typically taken out of deployment and stored. Thus, they were no longer a direct threat to the other party.

Constraining all nuclear warheads, including those that are non-deployed or associated with shorter-range missiles—that is, “non-strategic” systems—has never been tried before. It is difficult because neither side has ever wanted the other to come into its sensitive nuclear storage facilities—among the most secret locations in either country. Working out the verification and monitoring

regime for such an agreement would be complex and difficult with our negotiating partners.

In the end, however, I am confident that verification could be worked out because of innovations that have developed over the years in technologies such as remote video monitoring and movement detection. New START also pioneered verification techniques in reentry vehicle on-site inspection (RV OSI) to confirm the numbers of warheads on the front ends of missiles, using soft covers and radiation detection equipment to check on non-nuclear objects. Such innovations make warhead monitoring possible, though extremely complicated. Nonetheless, constraining all nuclear warheads is the right goal for the next big negotiations.

For that reason, we should look for a quick win with further reductions while we plan these new negotiations. Here, I return to the important innovation that the George W. Bush administration developed in 2002: the Strategic Offensive Forces Treaty (SORT). SORT took advantage of a treaty that was in force, START, to maintain a simple approach. Only a few pages long, it called for a further reduction below the START limit of 6,000 deployed warheads on each side to 2,200. START continued, so its verification regime was still being implemented. The new reductions were accounted for in the database, notifications and inspections of START. It was an elegant solution.

**The SORT model
could be used for an
additional reduction
below the New
START level**

This model could be readily used for an additional reduction below the New START level of operational warheads, which is 1,550 (down from the 2,200 in SORT). In 2013, the Joint Chiefs of Staff of the United States indicated their view that up to a one-third further reduction in operationally deployed strategic warheads could be taken without effect to US security.¹³ The United States proposed it at the time to the Russians, but there

was no interest. If renewed, such a proposal would reduce US and Russian operationally deployed strategic nuclear warheads to approximately 1,000 on each side. If New START were extended, then its verification regime would continue to be implemented, so the new reductions would be accounted for in its database, notifications, and inspections.

This model could provide a quick success for nuclear arms control policy. Of course, nuclear reductions must be ratified by the US Senate and Russian legislature, as SORT was. With continuing support from US military leadership, a ratification process can be successful, although it will be difficult to achieve, just as New START initially was.

Incentivizing Chinese Participation

The Trump administration has also argued that China should come to the table because of the rapid nuclear modernization that Beijing has underway. China has little incentive to do so right now though, so it is difficult to see what might be a quick win with them on nuclear arms control policy. They have far fewer intercontinental nuclear missiles and bombers and far fewer warheads. By most estimates, China has fewer than 500 total warheads, while the United States and Russia each have around 4,000. Even if China engaged in a rapid build-up, it would take them time to catch up. Encouraging that objective should not be a goal of US policy.

To say it another way, we will have strategic warning if the Chinese decide to sprint to parity. We need to continue to watch the trend lines closely to ensure that we are not taken by surprise, but we will not wake up tomorrow to find the Chinese our nuclear equals. Nevertheless, the administration has a good idea: get the Chinese engaged in negotiating restraints on their nuclear arsenal sooner rather than later.

The Chinese have taken some steps in that direction, becoming members of the NPT regime in 1992, signing the Comprehensive Test Ban Treaty, and agreeing to a global moratorium on explosive nuclear testing in 1996. But they have never wanted to talk about their nuclear arsenal at the negotiating table, evidently afraid of shining too much light on their weaknesses compared with the United States and Russia. Devising an incentive to get them to the table will require another tack.

Here, I think immediately of a replacement for the INF Treaty. It is a strange point of history that the INF is called the Intermediate-Range *Nuclear* Forces Treaty, but it actually banned *all* ground-launched missiles of intermediate range—from 500 to 5,500 km—nuclear and conventional. Once again, this generalization is because of the challenges of counting, limiting, and monitoring warheads. In the 1980s, when INF was negotiated, neither the United States nor the USSR was interested in having the other side poke around in its warhead storage facilities or at nuclear bases. The answer was to ban all missiles in the range and assume once again that the warheads, relegated to storage, were no longer a threat because the missiles that launched them were gone.

This inclusion of conventional weapons is precisely why the Chinese have no interest in entering a precise replica of the INF Treaty. They are assuming that all intermediate-range ground-launched missiles would have to be banned, thus cutting out the heart of their missile force posture—nuclear and conventional. They have invested heavily in deploying intermediate-range ground-based ballistic and cruise missiles for defense against regional threats. They never officially include Russia among these threats, though the Russians are deploying more and more potent missiles in their Far East.

Beijing does talk freely about US threats and the necessity of targeting US naval carriers. Its new and accurate missiles are dual-capable (both nuclear and conventional) and they have earned the name “carrier killers.” China depends on them for defense and would not agree to ban them outright. However, because we are developing more sophisticated tools to distinguish nuclear from conventional objects on the front ends of missiles, we may be able to “put the N back in INF.”¹⁴

Reentry vehicle on-site inspection methods can be used to do just that. We should talk to Beijing about these other options now: we could ban only nuclear-armed intermediate-range missiles that are ground-based, leaving conventionally armed missiles deployed. Alternatively, we could set a limit on the allowable number of nuclear-armed missiles, though this would be more challenging because monitoring a limit is always more difficult than monitoring a total ban.

Despite the complexities, this is the arena where we could craft an incentive for Beijing to come to the table—if not next week, then perhaps in half a year. They have been watching closely, no doubt, the deployment of the 9M729 missile in Russia. The Russians have proposed a moratorium on such missiles in Europe. If somehow the Europeans and Americans agreed, would those missiles now deployed in Europe come to the Asian territory of Russia? China is doubtless paying close attention to the fate of the moratorium.

What is more, the United States has vowed to respond to the Russian INF violation by deploying new ground-launched intermediate-range missiles of its own, on the territories of its European and Asian allies. Although the United States stresses that these missiles will only be conventional, Beijing must be concerned about the high accuracy and reliability of the US systems.

Constraints on intermediate-range ground-launched missiles might bring China to the negotiating table

In sum, constraints on strategic nuclear systems are unlikely to bring China to the negotiating table, but constraints on intermediate-range ground-launched missiles might. Their incentives all lie in that area—prevent the United States from deploying on the territory of its Asian allies and prevent the Russian Federation from unfettered deployment in the Russian Far East. This incentive would be particularly relevant if a successful European moratorium drove the Russian missiles east of the Urals.

Therefore, the United States should work hard and fast to make these incentives clear, while in no way giving up negotiating leverage. Beijing needs to believe that Washington is about to deploy new ground-launched missiles in Asia, and soon. Moscow would have something of a similar incentive structure, because it would soon face new US intermediate-range missiles in both Europe

and Asia. In this way, negotiation of a replacement for the INF Treaty could get under way fairly soon, even if the outcome would take some time to accomplish. Nevertheless, even the early arrival of China at the negotiating table would be a quick win for US policy.

The Complex Middle Distance

Once momentum is restored, more complex future negotiations can begin to take shape. A number of interesting ideas and proposals are already in development, from both US and Russian authors.¹⁵ They would require some time to get ready for the negotiating table and to negotiate—and newer ideas, such as verifiable limits on non-strategic nuclear warheads, would take even longer. And although it may be possible to create the incentives to get China to the table early to talk about constraints on INF-range missiles, such limits would also take time to negotiate.

Not every nuclear arms control measure needs to be inscribed in a legally binding treaty. Historically, some countries have achieved success with so-called parallel unilateral initiatives, such as the Presidential Nuclear Initiatives (PNIs) of 1991–92. Presidents Bush and Yeltsin, and later Gorbachev, simply committed their countries to remove nuclear weapons from surface ships and attack submarines (SSNs), eliminate a large number of non-strategic nuclear warheads, and carry out a number of other unilateral acts to lessen nuclear dangers. They were undertaken at a time when the Soviet Union had just collapsed and were seen as an expeditious way to ensure that nuclear weapons remained safe and secure in the former Soviet Union.¹⁶

Even prior to the PNIs, however, the Kremlin faced unrest in some of the Soviet republics and decided to withdraw non-strategic nuclear warheads back to Russia. This process was underway by 1989, so at the time of the Soviet break-up in 1991, non-strategic nuclear warheads were not deployed in any of the newly independent states. Warhead withdrawals also took place from Warsaw Pact countries in Eastern Europe before the collapse of the alliance. These were important unilateral measures that were little heralded at the time, although they were no secret—I happened to be in Moscow in 1989 and saw Soviet news coverage of the warhead trains returning to Russia.

The trouble with unilateral measures, of course, is that one must depend on catching them on TV or watching them with overhead satellites and other reconnaissance assets. There can be no strict monitoring of unilateral actions with procedures agreed upon in advance. Invitations to view unilateral actions displayed by the government implementing them can be nice goodwill gestures, but they are no substitute for a negotiated verification regime. There, obligations are understood in advance and the monitoring procedures are negotiated to ensure that

obligations are being met. In goodwill visits, inspectors are shown what the government wants them to see and no more.

Agreements can also be politically binding rather than legally

Agreements can also be politically, rather than legally, binding. A clear example is the executive agreement that became the Joint Comprehensive Plan of Action (JCPOA), the 2015 deal with Iran to halt its nuclear program. This agreement, rejected by President Trump, contains some carefully crafted measures to monitor Iran's production of fissile material. The International Atomic

Energy Agency (IAEA) implements the verification regime and certifies Iran's compliance on a regular basis. Although Iran's behavior since the US withdrawal from the accord has complicated the process, the IAEA in general has continued to have access and make its assessments.¹⁷

A multiplicity of confidence-building regimes rest on political agreements rather than legally binding treaties. The Vienna Document, which defines a series of measures to build confidence on conventional force postures, has existed in Europe since the 1990s. The measures include regular data exchanges and notifications of activities, including exercises, as well as opportunities to visit military sites where activities are taking place. It has proven to be an effective way to expand the circle of conventional confidence-building beyond the signatories to the CFE Treaty, who are members of NATO and the former Warsaw Pact. Countries who are members of the Organization for Security and Cooperation in Europe (OSCE) from as far away as Central Asia participate in the Vienna Document.

Unfortunately, as earlier noted, Russia has behaved fast and loose with regard to the conventional arms control regimes in Europe, ceasing to implement its CFE obligations in 2007, refusing to submit proper exercise notifications under the Vienna Document, and limiting observations under the Open Skies Treaty. Like its violation of the INF Treaty, Russia's misbehavior in this regard has raised doubts about its reliability as a partner for arms control activities overall, whether treaties, agreements, regimes, or unilateral measures.

Therefore, although all such mechanisms should be on the table in the future, interlocutors with Russia will have to keep a strict eye on implementation, no matter what form they choose. Indeed, negotiated measures with any country require sharp attention to implementation or else they will be meaningless. This requirement gives a strong impetus to look to the further future and consider what new opportunities may be emerging to give us greater certainty in the monitoring process. They may include all manner of verification measures, including National Technical Means of Verification (NTM).

New Technologies in the Further Future

Arms control goals will become more ambitious going forward. We will be limiting lower numbers of total weapons, when the marginal cost of cheating rises. If the United States and Russia, for example, agreed in the future to deploy only 100 missiles each, then one or the other could quickly gain advantage by deploying just a few missiles more. The items to be controlled will also become smaller: we are already moving to limit warheads, which is a challenge because they cannot be as easily seen and counted as large missiles, bombers, or submarines. We may also try to control technologies that do not manifest as hardware at all—cyber software is one example.

Therefore, we need to take a good hard look at new technologies for monitoring and verification, technologies that can help us to pursue new goals. New capabilities for ubiquitous sensing, whether smartphones or satellites in earth orbit, may lead the way to more effective verification in the future. Old technologies, such as the so-called NTMs, can also begin to take new forms with enhanced effectiveness. These developments spell fresh opportunities for success in arms control, although they will take some hard work to transform into verification measures at the negotiating table. Let us examine the new technologies one by one.

Verification Measures

NTMs are space-based satellites, reconnaissance planes, and large radars that can see over the horizon or in different spectra. They are basic to being able to trust, but verify, arms control commitments from other countries without being overly intrusive. From the very earliest strategic arms limitation talks in the 1970s, the notion of not interfering with NTMs was an idea in play. In those earlier treaties, on-site inspection seemed an impossible goal, because the deep secrecy of the Soviet system made it so.

At first, the Soviet regime was uncomfortable with the idea that NTMs should be able to view their equipment unimpeded. Despite the fact that their negotiators had agreed to non-interference in the SALT I interim agreement, Soviet troops continued to place nets over their missile deployments to hide them from overhead scrutiny. For this reason, the Americans cried ever louder for on-site inspection, which the Soviets eventually agreed to in the 1987 INF Treaty during the twilight of the USSR. Over time, they came to see reliance on NTMs in treaty monitoring as a way to temper demands for wide-ranging on-site access to their sensitive facilities.¹⁸

We, too, have interests in continuing to nurture and support the non-interference concept. NTMs allow us to tailor and limit the number of on-site inspections, which bear costs to our weapon system operators. Every time an on-site inspection is called at a base, base operations for the period of the inspection are shut down,

thus affecting operating tempo. Both we and the Russians have come to respect and utilize the noninterference concept—it was one of the easiest articles to be negotiated in New START—because we both recognize this benefit.

NTMs may be an early way we can begin to build interest and confidence in arms control in China

Now, NTMs may be an early way in which we can begin to build interest and confidence in the arms control process among those who have not participated before—first of all, China. It and others who have never participated in arms control negotiations need to understand that a lot can be done to tailor and limit on-site inspection if all parties agree that NTMs will be allowed to operate unimpeded.

At the same time, the concept of NTMs needs to be adjusted to new realities to be enhanced. In particular, it is high time to take into account commercial satellite constellations that any side may exploit in an arms control treaty or agreement. With the multitude of satellites in these networks, we are fast approaching a time when the whole surface of the earth will be photographed multiple times a day. Long-range reconnaissance drones are also becoming more commonly available for purchase or hire. They have become a fixture of intelligence gathering and targeting in Afghanistan and the Middle East, but they could also be used for arms control monitoring and verification. These new capabilities are well worth exploring, and not only for negotiated measures. A state may welcome use of enhanced NTMs as a way to confirm that it is undertaking unilateral measures, such as eliminating obsolete weapons or closing certain facilities.

States may also use enhanced technical means as a way to advance the effectiveness of confidence-building and diplomacy. Already, reconnaissance drones are being used in the Donbass region of Ukraine, where separatist forces backed by Russia have been battling the Ukrainian army for six years. The OSCE, responsible for monitoring the conflict, has been using drones to try to confirm that ceasefire measures are being implemented. Unfortunately, the separatists have frequently attacked the drones, so they clearly do not embrace the notion of non-interference with technical means.¹⁹

As we pursue diversified approaches to arms control policy, whether unilateral or negotiated, legally binding or political in nature, non-interference with enhanced NTMs may be one of the simplest tools. With the advent of commercial satellite networks, countries that never invested in large and expensive reconnaissance satellites can enter the game.

Of course, gaining the agreement or acquiescence of the companies that launch the satellites will be important. The relationship between commercial purchase of

satellite images and its use for treaty monitoring purposes need not be complicated, but it will have to be thought through. Will involving commercial firms somehow have to be part of an agreement? Or can they simply be a supplier who stands outside the regime? Can all parties who need images gain equal access, especially to ones that are expensive? Will commercial networks be as alert to attempts to spoof and impede monitoring as national authorities are? If not, how can the legitimacy of the images be assured? These and a myriad of other questions need to be considered, but they are well worth it for the potential benefits to be gained. In particular, they are techniques that countries such as China may be willing to embrace quickly, which would be well worthwhile.

There are larger opportunities emerging from ubiquitous sensors, whether on smartphones in our pockets or aloft, in low earth orbit. The information age is producing new ways to improve inspectors' ability to monitor nuclear weapons. For too long, we have been sending them in for treaty inspections with no better than a pad of paper, pens, pencils for drawing and writing, and a measuring stick. Would it not be better if they could use internet-connected electronic tools, at least for geolocation, or for recording what they are seeing and sending it back for quick analysis?

Beyond tools for inspectors, citizens might become involved (as they are in environmental monitoring) in crowd-sourcing to monitor for implementation of weapons bans. Even authoritarian regimes, unless they are cheating, may have an interest in proving that they are not producing chemical weapons or testing nuclear warheads. In other words, even a Vladimir Putin or Xi Jinping may decide that citizen monitoring helps them to do that.

The newly emerging area of space monitoring is one where crowd-sourcing techniques are already being explored. Academics in the United States and Russia are using crowd-sourcing tools to monitor space object behaviors for compliance to space policies and guidelines as well as to determine and describe conjunctions of space objects. These techniques help to inform national governments when conjunctions may be dangerous or result in damage or loss of a space-based asset. ASTRIAGraph is an example of this capability. Such cooperation could help to underpin further measures in the future, such as notifications that satellites are being moved from one orbit to another.²⁰

Where ubiquitous sensing is concerned, a community of experts has gone quite far in flagging and holding governments to account for weapons of mass destruction activities. Groups at the Stimson Center in Washington, DC and the James Martin Center at Monterey, along with organizations such as Bellingcat, have been able to monitor the North Korean nuclear program or to capture and analyze the effects of the Russian nuclear cruise missile testing accident in the White Sea in the summer of 2019, for example.²¹

The toolkit extends beyond satellite imagery to improved analytical tools to better cope with large amounts of information. As Josef Koller of The Aerospace Corporation put it, “The rise of large constellations with remote sensing satellites and capabilities ranging from synthetic aperture radar imaging, nighttime imaging, and infrared imaging is a global phenomenon. Coupled with AI analysis, data from different sensors can be combined, processed and made useful for a specific user’s needs ...” Koller goes on to note that the advent of 5G communications “will provide the data pipeline needed to reach users globally at broadband speeds.”²²

Bringing New Technology into Negotiations

This variety of sensors, the advent of AI tools to analyze small daily changes at nuclear sites, and the speed at which the results can be made available represent

New technologies represent a revolution for arms control monitoring and verification.

a revolution for arms control monitoring and verification. They will be devilishly difficult to negotiate, however, and for several reasons. First, treaty signatories are always wary of bringing foreign electronics into a sensitive facility: they might be used to gather more information than is required to verify that treaty obligations are being met. Countries will have a consistent concern about intelligence gathering, which is not the same as arms control verification.²³

Second, treaty signatories may be loath to grant legitimacy and authority to information acquired from sources other than their own. The Russian Federation has been reluctant to acknowledge commercial satellite photographs that NGOs have used to analyze its test failures. Third, signatories might be worried that too much information might result in conflicting assessments and confusion over compliance. The United States and Russia could get into information duels where each accuses the other of a treaty violation.

Such complexities in working through how to use the products of ubiquitous sensing are real, but they are not insuperable. Patient negotiation and small initial steps will be necessary, as well as some efforts to prove the principle. Early efforts to enhance NTM will be important, because all will have an interest in the potential to avoid large-scale, on-site inspection. When countries are themselves using enhanced NTM in the arms control arena, they may gain confidence with the larger concept of ubiquitous sensing.

Existing Innovations

While contemplating the next stages of arms control, whether to rebuild momentum in the near-term, develop complex agreements in the middle distance, or

create the verification regimes of the future, we must hold tight to innovations that have proven their worth. They will help us to produce new wins at all stages.

An excellent example is reentry vehicle on-site inspection in New START. As previously discussed, a re-do of the INF Treaty may benefit greatly from RV OSI, because the participants could use such techniques to monitor a ban or limit on intermediate-range ground-launched nuclear missiles. Other negotiations might also benefit from discerning nuclear from non-nuclear objects in an inspection regime. A new agreement that attempts to limit all nuclear warheads would certainly benefit from the techniques, combined with other intrusive monitoring measures still to be developed.

Another example of an innovation to hold tight is “freedom to mix”—an arms control term of art that may seem unpalatable during a pandemic but that has clearly proven its worth. Under freedom to mix, a country entering an arms control treaty may decide just how many weapons of a certain type it will deploy within a negotiated ceiling. At the same time, it chooses not to deploy others. In other words, it decides its own mix of weapons under a fixed ceiling or limit.

The Russians clearly have already made that calculation for New START, expressing a willingness to bring their new hypersonic glide vehicle (HGV), the *Avangard*, as well as their new heavy ICBM, the *Sarmat*, under the 700 delivery vehicle limit of the Treaty. In other words, they have decided what part of their established arsenal of ICBMs, submarine-launched ballistic missiles (SLBMs), and bomber weapons they will cut back to make way for these new, more exotic systems. The Russians will likely keep the HGV and *Sarmat* numbers limited, not wanting to cut back on missiles from their existing ICBM force which is dominated by highly accurate mobile missiles. These missiles, recently modernized, are much less vulnerable to attack than the *Sarmat* silo-based ICBMs and more predictable in their performance than the new HGVs. In fact, this is an important reason to extend New START, to keep both the *Avangard* and *Sarmat* under the limit of 700 on delivery vehicles in New START. There, they have to compete with existing ICBMs as well as the submarine-launched missiles and bombers in the Russian arsenal.

Did Somebody Say, “It’s Over”?

Despite the dire situation with existing arms control regimes, now is the time to think big about the future. In the near term, we must pay immediate attention to reestablishing momentum and repairing confidence in the US role in this realm of security policy. We can do so with a couple of quick wins, extending New START and negotiating a new reduction treaty that is based on the

model of the 2002 SORT. Bringing China to the table to talk about controlling deployments of intermediate-range ground-launched missiles may also be possible, if the incentives for them to do so are right. The near-term focus should be on keeping the process simple and moving quickly, depending on past precedents, lessons learned, and recent innovations.

In the medium-term, problems that had seemed overwhelming in the past, such as limiting all nuclear warheads, now seem within reach. A large agenda of substantive issues to tackle is steadily taking shape, as well as a menu of ways to do so. All should be on the table—negotiated measures, unilateral ones, legally binding treaties or agreements, political documents, codes of conduct, confidence-building, and cooperative measures.

However, treaty-based arms control should not be abandoned. Although the ratification process is difficult in the United States, it is worth the trouble, because legally binding treaties are among the most authoritative documents of the land. Under the US Constitution, they require both the executive and legislative branches to take responsibility for their importance to US national security. Of course, they too have their withdrawal clauses and can be discarded if a president decides that they are no longer in the US national security interest. But no other document matches their stature on the international and domestic legal scene, which provides an assurance that they cannot be treated lightly.

The biggest challenges are ahead, looking to the more distant future of monitoring and verification for nuclear weapons control. Here, the opportunities are great, as the emergence of more and more capable ubiquitous sensing technologies means that no inch of the earth will go unmonitored in the future. In this context, old tools of arms control, such as non-interference with NTMs, can take on new meaning—in the form of greater capability to monitor—and also more importance. For newcomers to negotiated arms control, such as China, agreeing not to interfere with NTMs may be a way to enter the game without having to submit immediately to intrusive on-site inspection. As the national security value of arms control constraints becomes clearer to new entrants, they may become readier to accept more intrusive measures over time.

The clear message is that arms control has a future—or rather three futures

The clear message is that arms control has a future—or rather three futures: immediate, medium-term, and distant. We need to achieve some immediate successes, and those should be simple and straightforward, to accomplish quickly. We do not need to revolutionize what has worked. The medium-term will require intense work, to confront new

and complex issues and bring them into new negotiations. A bellwether here will be implementing verifiable limits on all nuclear warheads: if we can

succeed in that arena, then we will know that we can achieve success controlling smaller units of account, even those that are hidden from sight.

The distant future requires patient study and the embrace of new technologies, but it is a prospect that can transform our notions of how to go about constraining nuclear weapons. It will be a revolution, but one that has the potential to keep nuclear weapons under control into the future, even as we move toward zero nuclear weapons. We always knew that the total elimination of nuclear weapons, as called for in the NPT, would be a gargantuan monitoring task, but new technologies will give us the potential tools to tackle it.

But let us first regain momentum, extend New START, and move quickly to negotiate a further nuclear reduction. We should also open a discussion with China on ground-launched missiles. The global excitement and approval that these steps will generate will seed the success of more ambitious objectives in the medium-term and encourage the embrace of new technologies that may revolutionize how nuclear arms control is conducted in the future. And while taking this long path, we can never lose sight of the fact that nuclear arms control must serve our national security goals.

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