The INF Treaty and New START: Escalation Control, Strategic Fatalism, and the Role of Cyber

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The fate of the Intermediate Nuclear Forces (INF) Treaty originally signed in 1987 between the United States and the Soviet Union now appears uncertain, since the United States has announced its intentions to withdraw from the agreement and Russia has stated it is prepared to respond accordingly. The significance of the withdrawal from the INF Treaty affects not only the immediate force sizes and structures but also the dynamics of nuclear deterrence in Europe and more broadly. Nowadays and in the future, the assessment of nuclear forces will be based on their agility, flexibility, and responsiveness to diverse circumstances of nuclear crisis management or of limited deterrence failure. As such, the significance of "cyber" grows accordingly: The "smartness" of deterrent forces, including their suitability for escalation control and for conflict termination, depends upon their information-dependent system integrity and resilience, especially if the template is complicated by the addition of missile defenses to the equation.

Keywords: Escalation control, nuclear war termination, cyberwar, INF (Intermediate Nuclear Forces) Treaty, arms control, nuclear modernization, deterrence, European security, missile defense, information warfare, crisis management

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Introduction

Political leaders and expert commentators have already pronounced the Intermediate Nuclear Forces (INF) Treaty a dead letter.[1] The possibility of a slowdown or even retrenchment in US-Russian nuclear arms control cannot be excluded.[2] The decision to jettison the INF Treaty and the implications of that decision for the New START (Strategic Arms Reduction Treaty) are often discussed in terms of alleged American or Russian violations of technical protocols. This perspective is important but insufficient. In the following discussion, we first consider the assumption of a world without the INF Treaty and its implications for deterrence stability and escalation control in Europe. Second, we discuss the New START, which could be taken hostage by a US-Russian confrontation in a post-INF world. Third, we assess the significance of US missile defenses as potential wildcards in determining the probable degree of US-Russian strategic nuclear stability with, or without, New START and the INF Treaty in place. Crossing over all these topics is the increasing future significance of military cyber technologies and its implications for nuclear deterrence stability.

The INF Imbroglio

President Donald Trump and Secretary of State Mike Pompeo have announced that the United States will withdraw from the INF (Intermediate Nuclear Forces) treaty. Signed in 1987 between the United States and the Soviet Union, the agreement was a milestone in nuclear arms control, requiring both NATO and the Soviet Union to remove from Europe all land-based

1 The full name of the INF treaty is the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of their Intermediate-Range and Shorter-Range Missiles. The treaty includes ground-launched ballistic or cruise missiles with ranges from 500 to 5,500 kilometers, whether nuclear or conventionally armed. The treaty was signed by US President Ronald Reagan and Soviet General Secretary Mikhail Gorbachev on December 8, 1987.

2 Expert assessments include William Tobey, Pavel S. Zolotarev, and Ulrich Kuhn, *The INF Quandary: Preventing a Nuclear Arms Race in Europe – Perspectives from the U.S., Russia and Germany*, *Russia Matters*, Issue Brief, January 2019, Belfer Center for Science and International Affairs, Harvard Kennedy School, https://www.belfercenter.org/publication/inf-quandary-preventing-nuclear-arms-race-europe-perspectives-us-russia-and-germany; and Steven Pifer, "Is There a Glimmer of Hope for the INF Treaty?," Brookings, December 27, 2018, https://www.brookings.edu/blog/order-from-chaos/2018/12/27/is-there-a-glimmer-of-hope-for-the-inf-treaty/.

ballistic and cruise missiles with estimated ranges between 500 and 5,500 kilometers. Trump's announcement of US plans to depart the INF agreement followed charges by the Trump and Obama administrations that Russia did not comply with the terms of the treaty due to its deployment of the SSC-8 ground-launched cruise missile (Russian 9M729). Russia has denied violations and has accused the United States of having deployed missile defense systems in Europe that could be repurposed as offensive strike systems within the treaty-prohibited ranges.[3]

Critics of Trump's decision to depart the INF Treaty expressed concern not only about the agreement per se but also about the implications of the US abrogation for the larger climate of US-Russian nuclear arms control. A deteriorating relationship between the United States and Russia over the INF Treaty could spill over into disagreement over extending the New START for strategic nuclear arms limitation, which was signed in 2010. Failure to extend the New START for five years in 2021 would leave the world's two nuclear superpowers without a reliable regime for limiting the numbers of nuclear warheads deployed on missiles of intercontinental range and on heavy bombers. In addition, the New START provides for inspections to verify the status of deployed warheads and launchers for each state, increasing

3 For background and perspective, see Lawrence J. Korb, "Why it Could (but Shouldn't) be the End of the Arms Control Era," *Bulletin of the Atomic Scientists*, October 23, 2018, https://thebulletin.org/2018/10/why-it-could-but-shouldnt-be-the-end-of-the-arms-control-era/.

See also Michael R. Gordon, "Russia Warns U.S. Moves Threaten 2011 Nuclear Pact," *Wall Street Journal*, January 15, 2019; Thomas Grove, "Putin Threatens Arms Race as U.S. Proposes to Exit Nuclear Treaty," *Wall Street Journal*, December 6, 2018; Pavel Podvig, "Russia Insists it is in Compliance with the INF Treaty," Russian Strategic Nuclear Forces, November 26, 2018, http://russianforces.org/blog/2018/11/russia_insists_it_is_in_compli.shtml; Rick Gladstone, "In Bipartisan Pleas, Experts Urge Trump to Save Nuclear Treaty With Russia," *New York Times*, November 8, 2018; Dmitry Stefanovich and Malcolm Chalmers, "Is This the End of Nuclear Arms Control?" *RUSI Newsbrief*, November 7, 2018, https://rusi.org/publication/newsbrief/end-nuclear-arms-control; Dmitri Trenin, "Back to Pershings: What the U.S. Withdrawal From the 1987 INF Treaty Means," Carnegie Moscow Center, October 24, 2018, https://carnegie.ru/commentary/77568; Steven Pifer, "The Trump Administration is Preparing a Major Mistake on the INF Treaty," Brookings, October 19, 2018; Ann M. Simmons, Thomas Grove, and Courtney McBride, "Russian Officials Slam Trump's Plans to Exit Nuclear Treaty," *Wall Street Journal*, October 22, 2018.

the transparency of each state's deployments, and therefore contributing to mutual trust.

Another by-product of discarding the New START and the INF Treaty could be an open-ended nuclear arms race in terms of deployments of strategic and non-strategic nuclear weapons (NSNW) in Europe and Asia.[4] Russia has been skeptical of INF restrictions for many years, as China and other states increased their deployments of intermediate and shorter-range ballistic missiles, while Russia's arsenal remained a treaty-compliant nullity. Officials in the Trump administration have also noted China's growing inventory of ballistic missiles as one reason for their decision to withdraw from the INF Treaty. According to experts, China views its land-based missiles armed with conventional warheads as "a pillar of their warfighting strategy" and useful across the spectrum of conflict.[5] As Jacob Stokes has noted,

> China plans to threaten or use its conventional missile arsenal against both regional countries and U.S. military assets and bases in Asia in the event of a future regional conflict, including one over Taiwan or islands in the East or South China seas. If such a conflict were to occur, experts assess China would use its conventional missiles to destroy its opponent's key military targets, starting with reconnaissance and early warning, command and control and air defenses, before moving on to missile sites, aircraft and ships.[6]

As a non-signatory to the INF Treaty, China has no legal obligation to limit its development and deployment of ballistic missiles over any ranges. US foreign and defense strategy, as well as nuclear posture statements, are focused on Russia and China as the principal threats to the United States and allied security—along with Iran and North Korea as important but lesser threats.[7]

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4 Mikhail Gorbachev and George P. Shultz, "We Participated in INF Negotiations. Abandoning it Threatens Our Very Existence," *Washington Post*, December 5, 2018.

5 Jacob Stokes, "China's Missile Program and U.S. Withdrawal from the Intermediate-Range Nuclear Forces (INF) Treaty," U.S.-China Economic and Security Review Commission, February 4, 2019, https://www.uscc.gov/sites/default/files/Research/China%20and%20INF_0.pdf.

6 Ibid., p. 4.

7 Grateful acknowledgment is made to Dr. Jacob W. Kipp for insights pertinent to this section. See also Dmitri Trenin, "Russian views of US nuclear modernization," *Bulletin of the Atomic Scientists*, January 2019, https://thebulletin.org/2019/01/russian-views-of-us-nuclear-modernization/.

Possible side effects from removing the constraints of the INF Treaty include not only an arms race in regional nuclear and missile deployments but also an unintentional blowback that reduces effective decision time for warning, crisis management, and nuclear response. One reason for signing the treaty in 1987 was because of the short flight times to their intended targets that the Soviet SS-20 IRBMs (intermediate-range ballistic missiles) and NATO's "572" deployments were presumably capable of achieving. Key cities in western Russia or in NATO's Europe could be attacked with little warning compared to that provided by land or sea-based intercontinental missiles of longer range. Reintroducing medium and intermediate ground-launched missiles into Europe could exacerbate a crisis by encouraging nations to place their respective nuclear attack warning and command-response systems on hair-trigger alert and prepared for prompt launch. Something like this happened in November 1983 when the NATO command post exercise Able Archer was in danger of being misconstrued by some Soviet observers as an actual alliance decision for nuclear release.[8] As Jon B. Wolfsthal has noted,

> In particular, the fear that misunderstandings could drive leaders on either side to make rash nuclear decisions for fear that decision time was short led to the negotiation of the 1987 Intermediate-Range Nuclear Forces Treaty, an agreement now on the chopping block.[9]

Other implications of the apparent US decision to depart the INF Treaty are more explicitly political in nature. One issue is the impact of dissolving the agreement on the political cohesion of NATO. Many European members of NATO might prefer to have the treaty remain in place even if either or both sides nibbled at the edges of noncompliance. From the standpoint of many Europeans, NATO's credibility as a deterrent to Russian aggression against a member state is less a matter of comparing numbers of deployed forces than it is about the reliability of the US nuclear guarantee for its allies. A wider spectrum of nuclear options for NATO and for Russia, with respect to the yields of warheads and the diversity of launchers on each side, carries

8 Ben B. Fischer, "Intelligence and Disaster Avoidance: The Soviet War Scare and US-Soviet Relations," Ch. 5 in *Mysteries of the Cold War*, ed. Stephen J. Cimbala (London: Routledge, 2018), pp. 89–104.

9 Jon B. Wolfsthal, "With Russia and the US, Nuclear Risks Never Go Out of Vogue," Russia Matters, November 8, 2018, https://www.russiamatters.org/analysis/russia-and-us-nuclear-risks-never-go-out-vogue.

the risk of prioritizing the graduation of nuclear response to the certainty of it. From this perspective, Russia must not be permitted to believe that it can bite off an arm or leg of NATO territory and remain immune to high-end conventional or nuclear response directly on Russian territory.

The alternative perspective is offered in the Trump administration's Nuclear Posture Review of 2018. From this standpoint, the United States and NATO require a wider spectrum of nuclear options in order to have a credible deterrent against Russian provocations short of unlimited nuclear war.[10] Russia might believe that it could "escalate to de-escalate" a conventional war in Europe that was going badly for Russia by engaging in nuclear-first use as a bargaining chip to deter further NATO resistance or escalation. This view holds that a wider spectrum of nuclear options creates a more believable message with respect to intrawar deterrence and escalation control than a narrower range of choices.[11]

In some sense, we are back to the concept of limited war as a generator of risk, as Thomas Schelling has so expertly discussed it.[12] That is, what is most important about a limited nuclear war is not the damage that has already taken place but rather the relationship between that damage and the opponent's expectation about what further damage might ensue. This expectation will be based partly on the opponent's estimate of the first side's capabilities but also on its estimate of the first side's resolve in continuing up the ladder of escalation if its demands are not met. What is being tested

10 The case for nuclear flexibility is explained in Keith B. Payne, "Nuclear Deterrence in a New Era: Applying 'Tailored Deterrence,'" *National Institute for Public Policy* no. 431, May 21, 2018, http://www.nipp.org/2018/05/21/payne-keith-b-nuclear-deterrence-in-a-new-era-applying-tailored-deterrence/.

11 Stephen J. Cimbala, "The Trump Nuclear Posture Review: Three Issues, Nine Implications," *Strategic Studies Quarterly* 12, no. 2 (Summer 2018): 9–16. See also Payne, "Nuclear Deterrence In a New Era: Applying 'Tailored Deterrence'; and Nikolai N. Sokov, "Why Russia Calls a Limited Nuclear Strike 'De-escalation,'" *Bulletin of the Atomic Scientists*, March 13, 2014, https://thebulletin.org/2014/03/why-russia-calls-a-limited-nuclear-strike-de-escalation/.

12 Thomas C. Schelling, *Arms and Influence* (1966; New Haven: Yale University Press, 2008).

in this instance is the capacity of both sides for risk management under conditions of uncertainty.[13]

The Priority of Risk Management

The significance of the preceding observation goes beyond the specific scenarios of escalation and limited nuclear war in Europe. In the second nuclear age, following the end of the Cold War and the demise of the Soviet Union, the major challenges to nuclear-strategic stability may occur in regions outside of Europe: the Middle East, South Asia, and East Asia.[14] In those settings, states and their leaders will be tested not only on their ability to practice deterrence per se but will also be expected to rise to the demands of risk management under conditions of uncertainty. Insufficient thought has been given to this problem, even in scenarios of an outbreak of major war in Europe, and even more so, with regard to Middle Eastern and Asian contretemps. What, for example, do we reliably know about the perspectives held by the leaders in Iran, Pakistan, or North Korea on risk management with respect to nuclear escalation? Precious little is the answer, based on what is available in the public domain.

The challenge of risk management in and outside of Europe is also related to the arguments for or against retaining the INF Treaty and or New START. With respect to the INF agreement, a proliferation of medium- and intermediate-range missiles within Europe creates a Pandora's box of scenarios for which escalation management, including the problems of intrawar deterrence and war termination, have been thought through only superficially. War games at think tanks and war colleges may delve into these issues, but the analysis and discussions are confined largely to audiences of expert analysts, scholars, former diplomats, and military commanders. The diffusion of findings from these and other studies into the DNA of policy makers is a more complicated problem. Harvard's Kennedy School emphasizes the importance of the difference between "policy formulation" and "policy

13 Some experts doubt that any shooting war between the United States and Russia could be contained below the nuclear threshold. See Paul Goble, "Any US-Russia Military Clash 'Highly Likely' to Escalate into Nuclear War, Arbatov Says," *Eurasia Review*, December 5, 2018, https://www.eurasiareview.com/05122018-any-us-russia-military-clash-highly-likely-to-escalate-into-nuclear-war-arbatov-says-oped/.

14 Paul Bracken, *The Second Nuclear Age: Strategy, Danger, and the New World Politics* (New York: Henry Holt/Times Books, 2012).

implementation" for very good reasons. The implementation of policies requires a currency conversion: from good ideas and theoretical insights into procedures, routines, and standard operating procedures that organizations have rehearsed and practiced under realistic operational conditions.

Cold War experience with nuclear crisis management is a reminder of the difficulty in getting policy makers and operators on the same page with respect to signaling determination and conciliation at the same time. During the Cuban missile crisis, for example, President Kennedy and members of the ExComm (his senior advisory group for crisis management) sought to convey to Soviet Premier Khrushchev that the United States was determined to have Soviet medium- and intermediate-range missiles removed from Cuba. But the United States also sought to achieve this objective without military escalation that could lead to an outbreak of war with the Soviet Union, including possibly expanding that war into a nuclear conflict. Accordingly, the United States instituted a blockade or quarantine against Soviet ships headed to Cuba. This decision was intended as a limited escalation in order to give the Soviets an option for a face-saving retreat without horizontal or vertical escalation.

Throughout the tense thirteen days of the Cuban missile crisis, leaders were plagued by misperceptions of intentions and "normal" bureaucratic behavior that created dysfunctional speed bumps in the way of conflict resolution. In the American case, a U-2 reconnaissance plane on a routine mission wandered into Soviet air space, causing Soviet fighters to scramble; a scheduled test launch of a US intercontinental ballistic missile (ICBM) from California went ahead despite the heightened alert levels on both sides; and, an American U-2 was shot down over Cuba based on the decision made by a local Soviet commander. On the Soviet side, in addition to the deployment of medium-range ballistic missiles (MRBMs) and (IRBMs), the Soviets also deployed nuclear-capable tactical missiles with their ground forces in Cuba, with the understanding that ground force commanders could use those missiles in the event of an American invasion of Cuba. As the crisis reached its denouement, Cuban leader Fidel Castro urged Khrushchev that the Soviet Union should launch a preemptive nuclear-first strike against the United States. Castro claimed to have incontrovertible evidence that the United States was preparing for an imminent attack on Cuba. As Khrushchev recalled,

> Only then did I realize that our friend Castro, whom I respect for his honesty and directness, had failed to understand us correctly. We had installed the missiles not for the purpose of attacking the United States, but to keep the United States from attacking Cuba. What does it mean to make a preemptive strike? We could deliver the first blow, but there would be an immediate counterblow—both against Cuba and against our own country.[15]

Of course, Khrushchev had additional motives for deploying nuclear missiles in Cuba, including an attempt to change the perceived balance of strategic nuclear-missile power between the United States and the Soviet Union. However, he was able to climb down the ladder of escalation because the US management of the crisis offered an option between provocation and conciliation. The United States publicly accepted removal of the Soviet nuclear-capable missiles from Cuba in return for an American promise not to invade Cuba. In addition, the United States also secretly agreed to the eventual removal of Jupiter medium-range missiles from Turkey, about which the Soviets had previously complained.

These reflections on the Cuban missile crisis are not a distraction from our present endeavor, but a warning. As dangerous as the crisis was for humanity, it benefited from a simple structure of social action. Two governments shared responsibility for starting the crisis and for ending it. In the United States and the Soviet Union, political leadership exercised authoritative control over the armed forces. Although the allies' needs and expectations figured into Soviet and American decision making, the crisis was about the strategic nuclear relationship between two superpowers and the stealthy attempt by Khrushchev to adjust the perception of that balance.

In contrast, now consider a future crisis in Europe between NATO and Russia. NATO has expanded to twenty-nine countries from sixteen during the Cold War. In theory, a decision to invoke Article 5 in favor of collective military action requires unanimous consent of member states, as represented in the NATO Council. In this large and heterogenous group, it will be sufficiently difficult to reach a consensus in favor of any military action unless the Russians plump for an all-out invasion of Western Europe with the objective of dismantling NATO and occupying its remains. However,

15 Jerrold L. Schecter *Khrushchev Remembers: The Glasnost Tapes*, trans. and ed. Vyacheslav V. Luchkov (Boston: Little, Brown, 1990), p. 177.

Russia lacks the military capability to impose such a coup de main on NATO. Therefore, it is more likely that Russia will seek to use its capacity for hybrid warfare, combining unconventional and conventional military steps, in order to politically divide NATO. An infiltration of Estonia or Latvia by "little green men," combined with selective air and ground attacks in the Baltics and an extensive propaganda and disinformation campaign, could create a united NATO response; but such a campaign could also divide NATO into resisters and ambivalents, depending on who was threatened and to what extent.

Suppose, in the preceding case, NATO reacts with collective unity and begins to turn the military tide against Russia, with NATO's capabilities for conventional deep strike used against Russian forces engaged in fighting on NATO members' territory. Russian reinforcements from its western military districts come to the rescue of their besieged comrades in the Baltics, and NATO responds with air- and sea-launched strikes against Russian forces as they cross the border from Russia into Latvia. Russia interprets this last NATO move as an attack on its homeland and, in response, fires a warning shot in the form of an electromagnetic pulse burst that shorts out electronics throughout much of the battlespace and surrounding territories. The United States places its strategic nuclear and theater nuclear forces on higher levels of alert while continuing its conventional deep strikes into Russian-occupied Latvia or Estonia and across the border into Russia. Russia also alerts its strategic and theater nuclear forces and both states' nuclear C3 (command, control, and communications) systems are now on the *qui vive*.

This situation would be complicated enough with the present deployments of theater nuclear and conventional weapons in Europe. Adding in unlimited numbers of ground-launched medium- and intermediate-range missiles, per the demise of the INF Treaty, only complicates the challenge of nuclear risk management in this or any related scenario. Granted, the United States and Russia also have sea- and air-launched weapons that could contribute to intra-theater deterrence (or escalation, depending on the case). However, ground-launched missiles have the special character that their prompt strike capabilities and locations invite preemptive attack on themselves. Their launchers are at known, easily detectable locations and could be destroyed with conventional as well as nuclear weapons. Once nuclear forces have been alerted and the possibility of escalation across the nuclear threshold cannot be excluded, military leaders will be pressing for the early destruction of

MRBMs and IRBMs that are nuclear capable. Knowing this, Russian leaders may fear a situation in which they must "use them or lose them" and within a very small time for decision (shorter than the time assumed available for decision and response to a strategic nuclear attack by the United States on Russia or vice versa).

With respect to this or other possible scenarios in the European theater of operations, the United States and Russia might consider maintaining the INF Treaty in some revised form. Instead of banning all missiles of a certain range, they might agree to permit conventionally armed, but not nuclear-capable, ground-based delivery systems. An inspections regime could be established to verify that MRBMs and IRBMs deployed in Europe by either side are equipped only with conventional warheads. Russia would be free to deploy MRBMs and IRBMs (to an extent) and NATO could respond with symmetrical (more or less) deployments of its own. Verification of non-nuclear status would be more challenging for air-launched or sea-based systems, but not impossible. In any case, air-launched and sea-based weapons are less in need of verification, compared to ground-based systems, because they are less provocative from the standpoint of crisis stability. The known locations of ground-based systems make them potentially attractive targets for preemption.

One reason that the United States is better off with—as opposed to without—the INF agreement is that Russia has the advantage of being able to deploy intermediate and shorter-range ground-based missiles on its own state territory. On the other hand, if the United States sought to deploy ground-based missiles in Europe within range of Russia (or, for that matter, in Asia within range of China), consent of a willing ally to host those missiles and launchers would be needed. If those missiles were nuclear capable, the burden of acceptance on the part of US, European, or Asian allies would be even greater. This is part of the reason why European government officials have attempted to act as intermediaries between the United States and Russia in order to preserve the present INF Treaty. In addition, European leaders have urged the United States to build a more persuasive case for departing from the INF Treaty so that blame in the "public square" falls on Russia and not on the United States or NATO. As noted by one unidentified European diplomat, "The US administration needs to take the Europeans with them.

It's important that if the agreement fails it is clear to everyone that it is the Russians' fault. I think the administration gets this."[16]

Perhaps with the preceding points in mind, Russia steadfastly has blamed the United States for the probable demise of the INF Treaty, has denied any accusation of cheating, and has pointed to alleged US infractions of the agreement. Russian Deputy Foreign Minister Sergei Ryabkov reaffirmed Russia's refusal to accept responsibility for a failed treaty in November 2018:

> We believe that the US plans to withdraw from the INF Treaty, in case (this scenario) is implemented, will trigger a grave aftermath for European and global security. We deny any logic that tries to attribute to us actions, which allegedly pushed Washington to declare the plans to withdraw from the treaty.[17]

US decisions to withdraw from the INF Treaty, first announced by President Trump in October 2018 and reiterated by Secretary of State Mike Pompeo in early February 2019, have pointed to Russia's refusal to bring its development, testing, and deployment of the 9M729 missile into compliance with the requirements of the treaty. Instead of seeking to enforce the agreement by further negotiation and bargaining with Russia, the United States has closed the door on finding a mutually satisfactory solution and has offered to Vladimir Putin a putative excuse for Russian INF-range missile modernization and deployment, including in Europe.[18] In addition, the apparent demise of the INF Treaty, amid a poisoned political atmosphere between Washington and Moscow, has increased the likelihood of a total collapse of the US-Russian nuclear arms-control regime, including the future of the New START.

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16 Julian Borger, "European Diplomats Mount Last-ditch Effort to Stop US Scrapping INF Treaty," *Guardian*, November 18, 2018.

17 "Diplomat Repudiates Narrative that Russia's Moves Drive US into Abandoning INF Deal," *TASS*, November 19, 2018, http://tass.com/politics/1031456.

18 US Aegis-ashore systems deployed in Eastern Europe could, from the Russian perspective, constitute a preparatory violation of the INF Treaty, given the potential capability of their launchers to fire conventional or nuclear armed Tomahawk cruise missiles against Russia. The United States retired its nuclear armed Tomahawk cruise missiles between 2010–2013 but could quickly reinstate the nuclear option for Tomahawk if deemed necessary. See Theodore Postol, "Russia May Have Violated the INF Treaty. Here's How the United States Appears to Have Done the Same," *Bulletin of the Atomic Scientists*, February 7, 2019, https://thebulletin.org/2019/02/russia-may-have-violated-the-inf-treaty-heres-how-the-united-states-appears-to-have-done-the-same/.

The possible end to the INF Treaty is also connected to the durability of the entire Russian-American nuclear arms-control regime, including the fate of the existing New START on strategic nuclear arms limitation. New START will expire in 2021 unless automatically extended by both sides for another five years. The agreement limits each state to a maximum number of 1,550 warheads on land-based intercontinental ballistic missiles (ICBMs), submarine- launched ballistic missiles (SLBMs), and heavy bombers. The New START also limits the numbers of operationally deployed and reserve delivery systems available to each state. Although some arms-control experts might regard the automatic extension of the New START until 2026 as a "no brainer," the present and foreseeable political climate as between the United States and Russia does not guarantee such an outcome. One Russian author has warned,

> There is one more detail of fundamental importance. If the two leading military powers have failed to curb the race in strategic nuclear forces, there is no chance that hypersonic weapons, space-based systems, long-range conventional missiles, and cybersecurity warfare activities will ever be controlled. The arms race will spread to other domains.[19]

The Challenge of Cyber

Cyberspace activity is an example of the "domain spread" that may contribute to a weakening of deterrence and crisis stability. Cyberwar has the potential to undermine some of the basic premises upon which nuclear deterrence and crisis stability are based, in a number of ways.[20] First, nuclear crisis management assumes a certain degree of transparency about actors' intentions and capabilities. Cyberattacks could interfere with the clarity of communication between crisis-bound adversaries and lead them to doubt otherwise reassuring

19 Andrei Akulov, "Responding to US Unleashing Unfettered Arms Race: Russia's Options," *Strategic Culture,* October 22, 2018, https://www.strategic-culture.org/news/2018/10/22/responding-us-unleashing-unfettered-arms-race-russia-options.html.

20 Andrew Futter, "Cyber Threats and Nuclear Weapons: New Questions for Command and Control, Security and Strategy," Royal United Services Institute for Defence and Security Studies (RUSI), *Occasional Papers* (July 2016), https://rusi.org/publication/occasional-papers/cyber-threats-and-nuclear-weapons-new-questions-command-and-control.

indicators of no enemy plan for preemptive or preventive strikes. Second, cyberattacks could be designed to directly compromise the performance of another state's warning, C3 (command, control, communications), intelligence, surveillance and reconnaissance systems, increasing fears of surprise attack, and willingness to launch on warning with less than unimpeachable information. As David E. Sanger has noted,

> The implications of having our own command-and-control system compromised underscore why sabotaging similar systems in other nations is dangerous business. If American leaders—or Russian leaders—feared their missiles might not lift off when someone hit the button, or that they were programmed to go off-course, it could easily undermine the system of deterrence that has helped reduced the likelihood of nuclear war for the past several decades.[21]

Third, states actively engaged in peacetime computer network exploitation, including the mapping of enemy systems and procedures as well as the insertion of malware that may be activated "on the day," will find it difficult to resist the temptation to accelerate this exploitation as the onset of a crisis seems imminent. The result might be that as a crisis moves from its early to its later stages, the information needed to resolve it is ever more transient and unreliable. Fourth, cybersecurity issues have, in the case of Russia and the United States, contributed to a toxic political atmosphere of mutual suspicion and doubt with respect to any larger and mutually agreeable enterprises. Alleged Russian interference in the US presidential elections of 2016, including the Russian Internet Research Agency (IRA) and military intelligence's (GRU) manipulation of social media in order to plant false narratives about American politics and culture, has tied the hands of US leaders who might otherwise want détente and a more positive relationship with Russia.

Fifth, in addition to the corruption of information via attacks on computers and networks, cyberattacks have reportedly been used to disable nuclear infrastructure, including centrifuges and nuclear launch systems.[22] Sixth, in the future, smarter information systems and artificial intelligence decision aids may appeal to policy makers or commanders as substitutes for the human

21 David E. Sanger, *The Perfect Weapon: War, Sabotage, and Fear in the Cyber Age* (New York: Crown, 2018), p. 299.

22 Ibid., pp. 41–47 and 268–279.

factor in ensuring against nuclear vulnerability. For example, Russia's Cold War-era "dead hand" system for postattack launch of remaining ICBMs even after the national command authority had been paralyzed by nuclear strikes could inspire a twenty-first century equivalent that delegated the final decision to a truly automated "doomsday machine" even more relentless than its predecessor. Seventh, cyber issues are central to the evolving relationship between antimissile defenses and the offensive missile attacks that they are intended to defeat. Cold War-era missile defenses were mainly a competition in physics and engineering. Although physics and engineering obviously still matter, the effectiveness of future US, Russian or other national missile defenses will be more and more dependent upon whether they are "state of the art" in information systems that support C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance).[23] In the case of national missile defenses, information systems must be able to provide accurate and timely warning and attack characterization; distinguish real threats from decoys; prioritize intercepts relative to the proximate threat posed by various attackers; and close the loop from sensor to decision maker to shooter faster than the opposing force is able to do.

Eighth, related to this greater dependency upon cyber performance for missile defenses is the increased significance of space-based platforms and their growing requirements for improved cybersecurity.[24] Already the United States and other spacefaring powers use space systems for reconnaissance, geolocation, communications, command-control, intelligence gathering, missile attack warning, and other vital functions in support of national defense and security.[25] The weaponization of space systems until now has been deflected by the Outer Space Treaty and by shared understandings that

23 Rebecca Slayton, *Arguments that Count: Physics, Computing, and Missile Defense, 1949–2012* (Cambridge: MIT Press, 2013), pp. 199–209 and passim.

24 The US Defense Intelligence Agency (DIA) notes that "China and Russia, in particular, are developing a variety of means to exploit perceived U.S. reliance on space-based systems and challenge the U.S. position in space." See Defense Intelligence Agency, "Challenges to Security in Space," January 2019, p. 7, https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf.

25 Adm. Dennis C. Blair (ret.), "Why the US Must Accelerate All Elements of Space-Based Nuclear Deterrence," Defense News, February 7, 2019, https://www.defensenews.com/opinion/commentary/2019/02/07/why-the-us-must-accelerate-all-elements-of-space-based-nuclear-deterrence/.

space is a "commons" that is available and necessary to all. However, future technology could enable the basing of missile defenses or other weapons in space with space-to-earth or space to space strike capabilities. The latter is imminent, depending on the orbital paths of existing and future satellites. For example, the United States, Russia, and China are reportedly working on "repair" satellites that could closely approach another "friendly" satellite in order to repair its malfunctions and to refuel it for additional missions. On the other hand, the technology that permits "repair" satellites to work enables the same orbiters to disrupt or destroy another "unfriendly" satellite, should they choose to do so. To deal with this situation of a possible form of mutual space vulnerability, states will have to negotiate "keep away" circumferential zones surrounding their satellites and may also need to equip those satellites with self-defense mechanisms.

Ninth, cyberwar might contribute to a mistaken decision for a nuclear-first strike or prompt retaliatory launch, on the faulty assumption that the opponent had already decided to attack, or that an attack was actually in progress. Cyberattacks have several properties that contribute to first strike fears. Firstly, they are hard to detect. Malware may be inserted into another state's networks months or even years in advance, primed for later activation or nearly instantaneous cyberattacks against enemy command-control and communications systems may precede a kinetic attack. Secondly, cyberattacks are often difficult to attribute. Attackers purposely disguise their identities and some may impersonate third parties, implicating an innocent state actor or others. Thirdly, attacks on critical infrastructure or information systems can create panic among targeted decision makers who might therefore decide to strike at the plausible sources of the attack before their own systems fail.

To mitigate this danger of contamination of nuclear deterrence stability by the possibility of mutual cyber destruction, states might attempt to establish certain "rules of the road" with respect to peacetime and crisis-time behavior in cyberspace. One option is increased transparency with respect to the capabilities of states' systems for offensive and defensive computer network operations. Just as nuclear arms-control agreements limit the numbers of launchers and warheads available to each side and provide for monitoring and verifying of agreed limits, the broad compass of cyber defense and attack capabilities could be made known without compromising actual code or in-house protocols. This suggestion collides with the traditional expectations

of secrecy that mark all states' cyber activities. On the other hand, in a cyber competitive world, secrets are sometimes perishable; yesterday's secret system is often tomorrow's exposure. Edward Snowden and the Shadow Brokers compromised some of the National Security Agency's most powerful tools for offensive cyber operations, the so-called Tailored Access Operations (TAO) instruction manuals and codes.[26] And the Stuxnet worm used successfully against Iran's centrifuges became a cause célèbre when it unexpectedly mutated into a global problem.[27]

Another option for the United States and other major nuclear and cyber powers would be to adopt an agreement on "no first use" of cyber as well as nuclear weapons during a crisis. Such an agreement would be a declaratory policy that relies upon the good faith of the participants: A cyber "first use" would be difficult to verify, compared to the obviousness of a nuclear-first use. The reasoning behind this agreement would be that successful crisis management requires contending parties to fully understand the other side's actual intentions and capabilities, regardless of their disagreements about other matters. An agreement of this sort might be supported by an exchange of cyber experts among countries in peacetime and by encouraging regular channels of communication between the US Cyber Command and their counterparts in other countries.

INF, New START, and the Control of Escalation

The previous discussion is meant to establish the priority of cyber-related deterrence and risk management in creating a future viable framework for nuclear deterrence and crisis stability. The examples of cyber relationships with nuclear deterrence and crisis stability are only part of the potential for a collision course between nuclear arms races and new technologies. Meanwhile and apart from new technologies, the nature of the linkage between the INF Treaty and New START in the minds of American and Russian planners remains an open question. If additional INF deployments are undertaken by either side, these deployments will have a two-sided possibility with respect to the ladder of nuclear escalation. First, they can serve as firebreaks between the initial or early use of tactical nuclear weapons, on one hand,

26 David E. Sanger, *The Perfect Weapon: War, Sabotage, and Fear in the Cyber Age* (New York: Crown Publishers, 2018), pp. 226–230.

27 Ibid., pp. 21–25.

and the employment of strategic nuclear forces, on the other. Second, and in contrast, new INF could serve as conveyers for a slippery slope of escalation that was undertaken in the mistaken expectation that theater nuclear war could be sealed off from strategic nuclear attacks. This two-sided character of the relationship between INF and strategic nuclear forces has an inherent ambiguity that might appeal to some deterrence theorists but, at the same time, alarms policy makers and military strategists looking for "exit ramps" in the event of an outbreak of tactical nuclear warfare.

The political linkage between the INF Treaty and New START is also subject to diverse interpretations. One school of thought holds that the demise of the INF Treaty may create a domino effect that has a high probability of toppling New START and creating other negative by-products for nuclear stability. Russian president Vladimir Putin noted in late November 2018 that Russia would not allow an American withdrawal from the INF Treaty to go unanswered. According to Putin, Russia's military and political leaders will be tasked to develop responses to US abrogation of the treaty. The Russian president cited his previous warnings to the United States against its withdrawal from the ABM (Anti-Ballistic Missile) Treaty limiting missile defenses and Russia's response, in the form of hypersonic weapons capable of defeating any defense. At the same time, however, according to Putin, Russia will not be dragged into a new nuclear arms race; instead, Russia will emphasize "balanced development" of its armed forces.[28] Other Russian officials, however, have warned that a US departure from the INF Treaty could collapse the entire nuclear nonproliferation system and increase the risk of nuclear war.[29]

Nevertheless, the INF Treaty and New START are not two peas in a pod. The INF Treaty is a long-standing agreement that dates from 1987 (going into effect in 1988) and signed on the eve of the Cold War endgame. It was a historic achievement for its time, creating a security space for nuclear threat reduction in Europe, and contributing to the rapprochement between US president Ronald Reagan and Soviet leader Mikhail Gorbachev, which helped to peacefully end the Cold War. Although a case can be made for

28 "Russia Won't Be Dragged into New Arms Race, but Will Respond to US Withdrawal from INF – Putin," *RT*, November 20, 2018, https://www.rt.com/news/444394-putin-russia-inf-arms-race/.

29 Ibid. See also "Kremlin Concerned Over US Attempts to Reject New START Treaty Extension," *TASS*, November 29, 2018, http://tass.com/politics/1033396.

continuing the agreement on grounds of arms control, the political winds between the United States and Russia have shifted considerably since the halcyon days of the early post-Cold War years and the bromance between US president Bill Clinton and Russian president Boris Yeltsin. Putin wants a multipolar world that includes a militarily resurgent Russia, fearful of NATO expansion, of US-supported "color revolutions" in states bordering on Russia or in Russia itself, and of US missile defenses that could pose a threat to Russia's nuclear deterrent.

In this context, extending the New START to 2026 or thereafter neither poses an existential threat to Russia nor requires it to invest scarce defense resources that threaten its fiscal solvency. The US nuclear modernization plan for the next several decades anticipates replacement of each of the three "legs" of its strategic nuclear triad of ICBMs, SLBMs, and heavy bombers.[30] However, this plan can be accomplished within the constraints of the ceilings on warhead and launcher deployments in New START.[31] US planners anticipate that each leg of the triad will undergo qualitative improvement but not necessarily an increase in the numbers of missile or warhead deployments.

Missile Defenses: Meaningful or Malign?

The matter of American and NATO missile defenses remains a point of contention between Washington and Moscow, with potential side effects for the viability of New START. Russia attempted unsuccessfully to get restrictions on US missile defenses included in the New START of 2010 and are likely to raise this point again, in connection with any agreement to extend New START. In addition, Russia may also bring into the conversation the issues of long-range conventional strike systems and military uses of

30 Jon B. Wolfsthal, Jeffrey Lewis and Marc Quint, *The Trillion Dollar Nuclear Triad: US Strategic Nuclear Modernization Over the Next Thirty Years* (Monterey: James Martin Center for Nonproliferation Studies, January 2014), http://cns.miis.edu/opapers/pdfs/140107_trillion_dollar_nuclear_triad.pdf.

31 US Congressional Budget Office, *Approaches for Managing the Costs of U.S. Nuclear Forces, 2017 to 2046* (Washington, DC: Congressional Budget Office, October 2017), www.cbo.gov/publications/53211.

space. Either the United States or Russia might also want to introduce the issue of cyberwar and its possible relationship to nuclear-strategic stability.[32]

Russia's proclivity for stuffing other issues into the New START negotiations, other than the limitations on offensive warheads and launch systems, complicates what might otherwise be a straightforward process. Russia's contention that US missile defenses deployed in Europe could be repurposed as offensive strike systems—part of their quibbling with respect to INF as well as New START—is stronger on military-technical grounds, as opposed to realistic political ones. The US Navy has established a program to develop hypersonic boost-glide weapons for multi-service use, including possible deployments on Ohio-class ballistic missile submarines converted to launch cruise missiles or Virginia-class attack submarines with a specialized payload module. Conceivably the hypersonic glide body could also be deployed on cruisers and destroyers, creating a large number of sea-based prompt global strike (PGS) weapons with a range reaching large areas of Russia and China. Although sea-based weapons are not included within the scope of the INF Treaty, weapons that could be launched from the Mk-41 Vertical Launch System (VLS) deployed on ships and submarines could also be launched from the same system deployed on land, including the Aegis Ashore based in Romania (and an additional system planned for Poland).[33] With regard to New START, hypersonic glide weapons deployed on Virginia-class submarines would not fall within its jurisdiction, but warheads deployed on Ohio-class ballistic missile submarine launchers for hypersonic boost-glide vehicles could be counted against allowable New START totals. According to experts from the RAND Corporation, Russian leaders emphasize the US development of advanced conventional capabilities—especially hypersonic glide vehicles and missile defenses—not

32 On this issue, see Futter, "Cyber Threats and Nuclear Weapons" and Stephen J. Cimbala, *Getting Nuclear Weapons Right: Managing Danger and Avoiding Disaster* (Boulder: Lynne Rienner, 2018), pp. 191–205.

33 Andrei Akulov, "More Details on Reasons Behind US Decision to Leave INF Treaty," Strategic Culture Foundation, November 25, 2018, https://www.strategic-culture.org/news/2018/11/25/more-details-on-reasons-behind-us-decision-to-leave-inf-treaty.html. See also Strategic Systems Programs, Department of the Navy, "FY19 – FY23 Navy Intermediate Range Conventional Prompt Strike (IRCPS) Weapon System (WS) Development and Integration Presolicitation Notice," Solicitation Number N00030-19-R-0025, November 21, 2018.

necessarily because of immediate jeopardy to Russia's strategic deterrent, but because these US systems, "especially if fielded in larger numbers, may become a greater threat to Russia's second-strike capability."[34]

With regard to the preceding military-technical factors, much depends on the specific direction of US research and development efforts as they move toward actual deployment. But it seems clear even now that the United States could realize any conventional PGS modernization objectives with sea-based and air-launched platforms, excluding land-based deployments based on repurposed missile defenses. Politics weighs in favor of NATO restraint with respect to ground-based PGS systems of intermediate or larger range. Given the hard work in getting NATO consensus on the European Phased Adaptive Approach (EPAA) to missile defenses, a turncoat operation converting defenses into offensive weapons would be neither politically expedient for NATO nor militarily efficient.[35] A repurposing of Aegis Ashore for offensive missions would alarm Russia without providing a meaningful gain in NATO's already extensive conventional and nuclear strike power. Without EPAA, what deters Iran or another regional actor from moving faster toward actual nuclear weaponization and deployment? Only deterrence and the threat of punitive retaliation do in the case of any hostile nuclear launch; without defenses, there can be no additional threat of deterrence by denial.

Russians know all this, but they prefer to use American and NATO missile defenses as a bargaining chip and a bugaboo because this ploy supports Putin's rhetoric of being surrounded by an advancing West, pulsing with prepackaged color revolutions exportable into Russia's security space. Putin's points of argument about US and NATO antimissile defenses are, at least at the margin, logically inconsistent. On one hand, the Russian president brags of Russia's new hypersonic weapons that will surely defeat any US or allied Western missile defenses. On the other hand, US and NATO missile defenses present a security threat to Russia sufficient enough to cause Russia's strategic and military-technical hyperventilation.

Russian fears on this point are of two kinds. First, missile defenses themselves, if sufficiently competent and strategically located on a regional

34 Christopher S. Chivvis, Andrew Radin, Dara Massicot, and Clint Reach, "Strengthening Strategic Stability with Russia" *Perspectives* (RAND Corporation) (2017), https://www.rand.org/pubs/perspectives/PE234.html.

35 For important background and perspective, see Andrew Futter, *Ballistic Missile Defence and US National Security Policy* (New York: Routledge, 2013), Ch. 5–7.

and global basis, could nullify Russia's nuclear deterrent by threatening its strategic nuclear second-strike capability. A second concern is that, even if present and immediately foreseeable defense technologies cannot by themselves threaten Russia's nuclear deterrent, defenses might be part of a larger military-strategic schematic for disarming Russia. From this standpoint, advanced US and NATO missile defenses combined with long-range, conventional strike systems, cyberwar, and space-based or space-enhanced weapons, together with NATO's own version of hybrid warfare, could confer a coercive advantage in crisis management.[36] This more elaborate scenario for putative Russian vulnerability probably has more to do with Russia's history of resistance to foreign invasions and the cultural DNA left by that experience than it does with military-technical or nuclear-strategic realities.[37]

For example, the idea that the United States might decide to launch a disarming conventional first strike against Russia's strategic nuclear forces—in the expectation that Russia would somehow accept defeat or retaliate only with its own conventional weapons—strains credulity. From a military-technical standpoint, there is no feasible way for the United States or NATO to accomplish Russia's effective nuclear disarmament with conventional strikes only. Russia's launch detection of a massive US attack on its state territory from land- and or sea-based missiles would be followed almost immediately by an order for "launch on warning" of its available nuclear forces. Russia would not wait to determine whether the fast flying US missiles were equipped with conventional or nuclear-armed warheads, nor, for that matter, would the United States. In theory, either side might wait until weapons had actually been detonated on its state territory before responding with nuclear counterattacks; but in practice, that choice is highly unlikely as heads of state will be urged by their military advisors that they face a "use them or lose them" dilemma with respect to silo-based intercontinental ballistic missiles (ICBMs).

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36 Potential threats, mitigation options, and other aspects of US space operations receive expert consideration in Allison Astorion-Courtois, Robert Elder, and Belinda Bragg, "Contested Space Operations, Space Defense, Deterrence, and Warfighting: Summary Findings and Integration Report" NSI, 2018, https://nsiteam.com/social/wp-content/uploads/2018/11/Space-SMA-Integration-Report-Space-FINAL.pdf.

37 Richard Lourie, *Putin: His Downfall and Russia's Coming Crash* (New York: St. Martin's Press, 2017), pp. 130–142 and passim.

The competence of US and Russian strategic nuclear forces with respect to deterrence and crisis stability can be estimated and summarized in the following tables. Table 1 illustrates plausible New START-compliant force structures for the United States and for Russia within the constraints of a 1,550 limit on the numbers of operationally deployed warheads on strategic launchers for each side. Table 2 summarizes the outcomes of nuclear force exchanges for four different scenarios of operational readiness and launch doctrine: (a) forces are on generated alert and launched on warning, (b) forces are on generated alert and riding out the attack, (c)forces are on day-to-day alert and launched on warning and, (d) forces are on day-to-day alert and riding out the attack. Tables 3 and 4 repeat this process for US and Russian forces limited to a maximum of 1,000 peacetime deployed warheads.

Table 1: US-Russia Total Strategic Weapons, 1,550 Deployment Limit

United States	**2017 Plan**	**Dyad Without ICBMs**	**Dyad Without Bombers**	**Triad 10 SSBN 300 ICBM**
ICBM	400	0	400	561
SLBM	1040	1407	1148	880
AIR	109	109	0	109

Russia	**Balanced Triad**	**No Bombers**	**No SLBMs**	**ICBMs Only**
ICBM	758	907	1412	1502
SLBM	704	640	0	0
AIR	70	0	88	0

Source: Force structures are based on author's estimates and New START counting rules. See also US Congressional Budget Office, *Approaches for Managing the Costs of U.S. Nuclear Forces, 2017–2046* (Washington, DC: Congressional Budget Office, October 2017), and Pavel Podvig, *Russian Strategic Nuclear Forces* (blog), http://russianforces.org/. Grateful acknowledgment is made to Dr. James Scouras for use of his Arriving Weapons Sensitivity Model (AWSM@) for making the calculations and drawing the graphs. He is not responsible for any analysis or arguments herein.

Table 2: US-Russia, Surviving and Retaliating Warheads, 1,550 Deployment Limit

United States	2017 Plan	Dyad Without ICBMs	Dyad Without Bombers	Triad 10 SSBN 300 ICBM
GEN, LOW	1282	1219	1290	1297
GEN, ROA	887	1148	966	771
DAY, LOW	948	788	983	1006
DAY, ROA	603	766	659	530

Russia	Balanced Triad	No Bombers	No SLBMs	ICBMs Only
GEN, LOW	1303	1335	1335	1352
GEN, ROA	885	816	500	501
DAY, LOW	1080	1164	1290	1352
DAY, ROA	693	645	495	501

Source: Author, based on Arriving Weapons Sensitivity Model (AWSM@) designed by Dr. James Scouras, who is not responsible for any analysis here.

Table 3: US-Russia, Total Strategic Weapons, 1,000 Deployment Limit

United States	1000 Triad CBO	Dyad Without Bombers	Dyad Without ICBMs	SLBMs Only
ICBM	218	280	0	0
SLBM	672	720	890	960
AIR	109	0	109	0

Russia	Balanced Triad	No Bombers	No SLBMs	ICBMs Only
ICBM	318	288	858	1000
SLBM	608	704	0	0
AIR	74	0	76	0

Source: As in Table 1 above.

Table 4: US-Russia, Surviving and Retaliating Warheads, 1,000 Deployment Limit

United States	1000 Triad CBO	Dyad Without Bombers	Dyad Without ICBMs	SLBMs Only
GEN, LOW	820	835	800	778
GEN, ROA	572	608	729	778
DAY, LOW	585	643	507	521
DAY, ROA	387	416	485	521

Russia	Balanced Triad	No Bombers	No SLBMs	ICBMs Only
GEN, LOW	833	829	828	900
GEN, ROA	614	684	243	226
DAY, LOW	795	829	789	900
DAY, ROA	364	399	239	226

Source: As in Table 2 above.

Tables 1 through 4 show that the United States and Russia can modernize their strategic nuclear forces within New START limits on deployed weapons, or at even lower levels, while maintaining deterrence and crisis stability. Neither should be challenged to provide for assured second-strike capability, absent dramatic changes in technology favorable to defenses compared to offense; even then, pessimists can only worry about relative disadvantage in counterforce wars. There is little or no likelihood of removing populations from hostage conditions to nuclear strikes even by smaller powers, let alone the more sizable arsenals of the United States and Russia. On the other hand, by dumping New START along with the INF Treaty, Russia and the United States could bring about a new arms race that threatens the basis of nuclear-strategic stability and the continued success of the Nuclear Nonproliferation Treaty.

Russian fears that US missile defenses could nullify their retaliatory strike anticipate missile defense technologies that outperform current capabilities by a considerable margin. However, this does raise another interesting question for the United States and for Russia, with respect to "how much is enough?" when it comes to improving antimissile and air defenses. Suppose the United States and Russia push to develop defenses that *can* offer preclusive protection against nuclear attack based on current missiles and air delivered weapons. Is the resulting deterrence system more or less stable, compared

to its predecessor based on secure second-strike capability with survivable offensive weapons? Or, for a more interesting and more practical question: Would we or Russia want to develop and to deploy antimissile systems that could guarantee, say, 80 percent effectiveness against any other state's nuclear second-strike forces?

The viability of nuclear deterrence depends on cognitive simplicity and clarity with respect to the expected outcomes of any large-scale nuclear exchange. If states believe that there is no technical escape from mutual vulnerability based on secure second-strike capability, then a choice by any state for a nuclear-first strike is self-evidently pointless. However, if defenses improve to a degree sufficient to create a continuum of possible nuclear exchange outcomes, such that some outcomes are judged acceptable or tolerable compared to others ("winning ugly"), then politicians and their military advisors might mistakenly see a nuclear standoff as a competition for relative advantage, instead of a trapdoor opening the way to mutual suicide.

The preceding statement is a controversial assertion that will be disputed by those who perceive that the threat of nuclear war, as opposed to the actual decision for a nuclear attack, can be used for the manipulation of risk and for nuclear coercion short of war. This counter-argument, that nuclear ambiguity can be more useful that nuclear certainty, is situationally dependent and needs to be carefully qualified.[38] Ambiguity can be used by one state to its advantage in a coercive bargaining process, *provided* the other state can see the difference between *threats short of war* and a *decision to launch an anticipatory attack*.[39] Nuclear ambiguity may characterize a bargaining *process*, but for that process to result in an acceptable *outcome*, nuclear certainty must exist about the effects of a nuclear war.

Conclusion

The end of the INF Treaty is part of a larger problem: the need to transition to a new framework for US-Russian nuclear-strategic stability. The challenge for the Trump administration and its successors will be to manage the

38 Expert discussion of this issue appears in Todd S. Sechser and Matthew Fuhrmann, *Nuclear Weapons and Coercive Diplomacy* (Cambridge: Cambridge University Press, 2017).

39 On the problem of anticipatory attacks, see Karl P. Mueller and others, *Striking First: Preemptive and Preventive Attack in U.S. National Security Policy* (Santa Monica: RAND, 2006).

transition in three aspects: first, to maintain the cohesion of NATO and other US alliances with respect to political decision taking, military preparedness, and arms-control initiatives; second, to protect an interim level of strategic stability with Russia while a new Russian-American security framework is being created; third, to incorporate new actors, especially China, into a new framework for nuclear-strategic stability; and, fourth, to include recognition of the increased importance of new technologies, including those for the security-related uses of space, and cyber.[40]

The costs and benefits of ending the INF Treaty and jeopardizing the extension of New START are not only measured in the possibility of renewed nuclear arms race on the European continent—important as that problem is—but also in terms of the impact on the dynamics of crisis management and escalation control. Departure from the INF Treaty creates a more complicated decision space in several directions: between conventional and nuclear war; between nuclear-first use and an expanded theater-wide conflict; and, most importantly, between theater and strategic nuclear warfare. Sub-strategic nuclear weapons deployed in Europe are two faced: They are seen as deterrents by their owners, but they also invite preemptive attack on themselves at the earliest stages of a conflict. Or, if you prefer: how many Able Archers can a system withstand?[41] In addition, if a defunct INF agreement is followed by American and Russian refusals to extend the New START beyond 2021, nuclear arms control will be on a possibly irreversible descent into irrelevance. In this admittedly gloomy scenario, the Nuclear Nonproliferation Treaty may feel the tremors from the abdication by the two

40 Frank A. Rose, "The End of an Era? The INF Treaty, New START, and the Future of Strategic Stability," Brookings, February 12, 2019, https://www.brookings.edu/blog/order-from-chaos/2019/02/12/the-end-of-an-era-the-inf-treaty-new-start-and-the-future-of-strategic-stability/.

41 Able Archer 83 was a NATO command post exercise in November 1983, testing procedures for nuclear release and potential use in case of war. The exercise took place during a time of heightened US-Soviet tensions over various issues, including competing NATO and Soviet nuclear missile deployments and an ongoing Soviet KGB intelligence operation (RYAN) to detect signs of a possible NATO nuclear first strike. See Raymond L. Garthoff, *The Great Transition: American-Soviet Relations and the End of the Cold War* (Washington, DC: Brookings Institution, 1994), esp. pp. 138–139, and pertinent references therein. See also Ben Macintyre, *The Spy and The Traitor: The Greatest Espionage Story of the Cold War* (New York: Crown Publishers, 2018), pp. 142–148.

nuclear superpowers, and events may encourage other non-nuclear weapons states to reconsider their priorities.[42]

Admittedly, the challenge of keeping the INF Treaty in place is more complicated for Washington and Moscow than is the less controversial forwarding of New START. Russia's interest in deploying additional land-based medium and longer-range missiles in Europe and in the Far East reflects its perennial fear of encirclement, of additional "bracket creep" in NATO's membership, and of China's rising numbers of ballistic missiles of various ranges. Russia also fears an outbreak of next generation conventional US PGS systems supported by improved antimissile defenses, space-based weapons, and cyber threats, even though Russia is modernizing its military capabilities in all these categories.[43] The possible costs of jettisoning INF include reduced stability of the military-strategic balance of power in Europe and, along with this, an unintentional lowering of the nuclear threshold based on confusion between designed flexibility and unintended or inadvertent escalation.[44]

It would be an understatement to say that cyber and information strategies are wrapped around all the arms-control issues discussed hitherto. Nuclear-strategic stability at or below the threshold of general nuclear war requires that certain shared expectations between potential adversaries be cultivated like delicate flowers. For deterrence to hold firm, leaders must have confidence that they have an accurate understanding of their opponents' capabilities and intentions, including their theories of war and assumptions about deterrence. During the Cold War, these shared expectations developed slowly over time between the Americans and Soviets, and then among their respective alliance partners (for the most part, with unavoidable French pirouettes and Maoist disclaimers offering occasional distractions). Future frameworks for nuclear-

42 For pertinent background, see Henry D. Sokolski, *Underestimated: Our Not So Peaceful Nuclear Future* (Carlisle, PA: Strategic Studies Institute and US Army War College Press, January 2016).

43 Defense Intelligence Agency, *Russia Military Power: Building a Military to Support Great Power Aspirations* (Washington, DC: Defense Intelligence Agency, 2017).

44 For expert commentary on this issue, see the briefing by John K. Warden, "Limited Nuclear War: The 21st Century Challenge for the United States," Institute for Defense Analysis (IDA), SMA STRATCOM Speaker Series, September 12, 2018, https://nsiteam.com/social/wp-content/uploads/2018/09/Limited-Nuclear-War-brief-Warden.pdf.

strategic stability will have to work out similar protocols of reassurance with respect to nuclear deterrence and crisis management, but they will have to do so in the age of cyber. Now the very sources of information and assessment on which strategic reassurance is based are themselves in danger of deliberate or inadvertent compromise. As Sanger warns,

> Cyberweapons are entirely different from nuclear arms, and their effects have so far remained relatively modest. But to assume that will continue to be true is to assume we understand the destructive power of the technology we have unleashed and that we can manage it. History suggests that is a risky bet.[45]

As for New START, its deployment ceilings and other limitations provide sufficient numbers of survivable strategic weapons for the United States and Russia under foreseeable conditions of nuclear weapons modernization. Missile defenses, unless or until they are based on new physical principles or concepts, are unlikely to change this condition. In addition, New START also provides Washington and Moscow with transparency and verification with respect to missile and warhead deployments going forward. As for the relationship between the INF Treaty and New START, on one hand, and nuclear flexibility on the other, much is scenario dependent. The United States does not want to be in a position in which it has fewer options for escalation *and* for escalation *control* than its opponent does—for the sake of credible deterrence.[46] However, the United States and NATO do not want to allow nuclear flexibility to relax the high standards for crossing the nuclear threshold. Nor should Russia wish to do so.

45 Sanger, *The Perfect Weapon,* p. 296.

46 Russian nonstrategic nuclear weapons play an important role in Russian thinking about how to deter and defeat the West. Some Russian military planners and thinkers also have sought an additional capability for "prenuclear deterrence" based on long-range conventional strike systems. See Brad Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century* (Stanford: Stanford University Press, 2018), esp. pp. 134–136.