



# NAVIGATING DANGEROUS PATHWAYS

**A Pragmatic Approach to U.S.-Russian Relations and Strategic Stability**

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# Introduction

**T**he ongoing integration of new technologies by U.S. and Russian militaries – particularly cyber, space, long-range strike, missile defenses, autonomous systems, and big data analytics – is creating new and growing strains on strategic stability between these two great powers. The inherent difficulty of managing these strains is exacerbated by the overall deterioration of U.S.-Russian relations.

A previous report offered a framework for understanding the strains on strategic stability in this context of rapid technological change and difficult U.S.-Russian relations. This framework described the linked and changing dynamics of three interrelated pathways to crisis or conflict: (1) the future course of U.S.-Russian relations; (2) potential slippery slopes from peacetime to crisis and conflict; and (3) the possibility that conflict could escalate to attacks against each other’s homeland and even nuclear war.<sup>1</sup>This report builds on that framework by offering concrete recommendations for managing each of the three pathways.

## **Whatever the course of U.S.-Russian relations in the future, there will remain a possibility (one, we argue, that is growing over time) of sliding into crisis and even armed conflict.**

A key insight that arose from earlier work is that stabilizing U.S.-Russian relations requires actions along each of the three pathways, conducted in parallel. Shaping and managing the overall relationship is fundamentally important. But whatever the course of U.S.-Russian relations in the future, there will remain a possibility (one, we argue, that is growing over time) of sliding into crisis and even armed conflict. Moreover, if a crisis or conflict does occur, there is a possibility (also growing over time) that escalation to strategic attack could occur.

The previous study examined how new technologies may create new challenges for managing one or more of the three pathways. To take but one example, offensive cyber operations are a critical tool for “gray-zone” efforts such as the Russian meddling in the 2016 U.S.

presidential election, which clearly had a major impact on U.S.-Russian relations. In addition, because of their potential for creating disruptive or destructive effects without directly producing casualties and potentially with delayed attribution, cyberattacks on weapons systems and supporting infrastructure are likely to be extremely attractive early moves in any conflict. In addition, if offensive cyber capabilities are themselves somewhat vulnerable, there may be substantial incentives to “go early” and “go big” in cyberspace. To the extent that either side feared that the other could use cyber capabilities to delay or deny its non-nuclear capabilities, incentives to use nuclear weapons early would rise; fears that the other side’s cyber capabilities could degrade or deny a nuclear second strike could create “use-or-lose” incentives that would drive early use of nuclear weapons and seriously increase risks of a nuclear exchange. Indeed, even the discovery of an adversary cyber implant in one side’s nuclear strike systems – and uncertainty about its effects or worries that there may be

undiscovered others – could increase use-or-lose pressures. This example is emblematic of dynamics arising from technological advancements in space, long-range strike, missile defenses, autonomous systems, and big data analytics.

This report reiterates some of the context regarding each of the three pathways but focuses primarily on concrete recommendations for managing them. The aim is to help shape the ongoing debate regarding U.S.-Russian relations and guide actions affecting U.S. nuclear posture, ballistic missile defenses, cyber deterrence, and space resilience. The recommendations also address the American role in NATO and NATO-Russian relations, both of which are of critical importance to all three pathways.

# Managing Pathway #1

SHAPING THE FUTURE COURSE OF U.S.-RUSSIAN RELATIONS





*U.S. President Donald Trump meets with his Russian counterpart, Vladimir Putin, at the 2017 G20 Summit. (Wikimedia Commons)*

U.S. policy toward Russia must be based on a clear-eyed recognition that while the two countries have significant common interests, Russian President Vladimir Putin has chosen a path of strategic competition with the United States that is intended to bolster his country's power and standing while reducing America's credibility and role in the world. U.S. President Donald Trump entered office holding out the promise of better ties with Moscow, and he invited a relaxation of tensions. Yet amid congressional opposition, investigations into his campaign's possible ties to Russia, and the explicit skepticism of some of his own cabinet members, the president's overtures thus far have not resulted in any sea change. Sanctions remain in place (and indeed have been strengthened through congressional action); differences on key issues, including Syria, remain profound; and the United States continues to take steps to reassure NATO allies unnerved by Russia's recent provocations. While the near-term trajectory of the administration's approach both to European allies and Russia remains uncertain, it seems clear that the bilateral relationship will continue to be marred by significant tension and distrust.

Today, U.S. credibility and security are being undermined by the lack of a coherent and consistent approach to Russia. To achieve a robust and balanced American response, the report offers two recommendations that

are process-oriented, encouraging the development of clear U.S. policy on Russia and the creation of a Russia "campaign plan" to implement this policy. In addition, it offers recommendations that reflect the authors' judgment that the United States and Europe must impose costs on Russian leaders for their unacceptable actions, while mitigating the risk of a dangerous downward spiral in U.S.-Russian and NATO-Russian relations. Simultaneously, the United States should take steps that make sliding into conflict (the second pathway) less likely, for example by strengthening channels for senior-level communication and crisis management. And the United States should continue to seek areas of cooperation where interests coincide, such as sustaining the Iran nuclear deal and sanctioning North Korea.

Our recommendations follow.

**1. The Trump administration should clearly define and articulate its policy on Russia, working closely with Congress and NATO allies.**

Today, the U.S. approach to Russia is hampered severely by inconsistencies between the Trump administration and Congress, by inconsistencies within the administration, and by a lack of clarity among U.S. allies about Washington's approach. Although policy differences

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are not unusual and debate can be healthy, establishing a clear and sustainable American approach to Russia is fundamentally important. The stakes are too high to allow continued policy drift in the United States regarding Russia.

In the absence of a coherent American approach, Russian leaders are less likely to cooperate on common interests, as advocates of cooperation within Russian leadership will wonder whether the United States will reverse itself and make them appear naive. Russian leaders are also less likely to be deterred, as advocates of a more aggressive approach can argue credibly that Russia should take advantage of a window of incoherence in Washington. And of fundamental importance, in the absence of a clear U.S. policy and approach, Russian leaders are more likely to miscalculate how the United States will respond in a crisis – and if a crisis occurs, be more likely to miscommunicate.

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Moreover, the United States must provide a clear signal to U.S. allies, and leadership within NATO, about future relations with Russia. That requires a clear policy and a plan, and a unified message articulated by the president, senior administration officials, and, ideally, congressional leadership. It also requires sharing assessments of Russian behavior with senior officials in key allied governments, attempting to build a shared view of the Russian challenge, and enlisting NATO in a common, coordinated response.

### **2. In close coordination with its NATO allies, the United States should pursue a campaign plan approach to dealing with Russia.**

Defining and articulating U.S. policy is a necessary but not sufficient step toward a clearer and more coherent American approach to Russia. After establishing a clear policy framework, the Trump administration should develop a U.S. campaign plan for dealing with Russia. Such a plan is needed in order to provide a clear set of objectives to guide U.S. actions and coordinate the various tools of national power (including diplomatic,

informational, military, and economic). It would also provide a coherent set of actions that Russian leaders as well as U.S. allies can understand and allow both more effective cooperation where feasible and more effective deterrence where necessary.

A U.S. campaign plan on Russia should have multiple objectives. Perhaps the most important is to avoid military conflict and particularly nuclear war. However, even that objective cannot be pursued unconditionally: Protecting the U.S. democratic process from foreign interference and ensuring the security of NATO allies are also essential objectives worth pursuing even at risk of crisis or conflict. The allies should come to a common view about whether making Russia a “responsible stakeholder” in the international system – including in what it considers its “near abroad” – is a feasible goal and, if so, what combinations of positive and negative incentives are likely to be most effective over time.

In addition, the United States should work closely with NATO allies to deter further Russian military intervention in Ukraine, as well as in the Transnistria region of Moldova, the Nagorno-Karabakh region of Azerbaijan, the Abkhazia and South Ossetia regions of Georgia, and potentially elsewhere. Russia’s attempts to create “frozen conflicts” that reinforce its suzerainty over its so-called (and illegitimate) near abroad must be resisted. The instruments available to the United States to alter Russian behavior in these areas are self-limited given limited American stakes, and indeed the proper response to Russian intimidation and interference in these regions is not direct American military engagement. Yet Washington and its allies should choose from a menu of economic, diplomatic, and noncombat military tools that aims to effect long-term change.

It is beyond the scope of this report to detail a comprehensive approach to Ukraine or the various frozen conflicts, or more broadly to deterring Russian gray-zone activities (including interference in Western elections), let alone an overall U.S. policy for Russia. A comprehensive approach is, however, needed in each of these areas, and for U.S.-Russian relations as a whole. The authors strongly support initiatives to develop a campaign plan approach to U.S. and NATO day-to-day engagement with, and deterrence of, Russia.<sup>2</sup>

### **3. The United States should sustain biting sanctions on Russia.**

Sanctions on Russia for its bald-faced annexation of Crimea and continued military intervention in Ukraine and for its meddling in U.S. elections (sanctions overwhelmingly approved by Congress and signed by



Trump, despite his stated misgivings) will not undo the Russian state's malign steps. However, if the United States and the international community do not impose painful and sustained costs in response to Ukraine and interference in the U.S. election, Putin and his leadership coterie will certainly conclude that they have little to fear from Washington and its allies even in response to major acts of aggression, as long as there is the thinnest patina of deniability. Indeed, it may be the case that Russia's meddling in the 2016 U.S. presidential election continued precisely because it generated benefits without the United States imposing costs.

Changing this cost-benefit calculation, both with respect to interference in democratic systems and to military aggression, should be a central objective of U.S. policy. Doing so requires, at a minimum, the continued application of strong sanctions in response to previous Russian actions. Sustained strong sanctions are fundamental not only to the credibility of U.S. and international deterrent threats against future gray-zone aggression by Russia, but also as clear signals to other actors that the United States can and will impose enduring costs for unacceptable behavior.

The authors believe that sanctions on Russia to date are at a minimal level, and would welcome additional measures to increase their bite, particularly to the interests of Putin and his close advisors – after all, it is Putin and his senior advisors whose future behavior the United States and Europe aim to influence. As evidence mounts of Russian meddling in allied democracies (e.g., the recent French presidential election), Washington should seek to enlist European nations in such sanctions.



*A fighter in a Russia-backed militia guards his position in eastern Ukraine. (Mstyslav Chernov)*

#### **4. U.S. and international sanctions should be conditional on Russian behavior.**

At the same time that U.S. and international sanctions should be sustained, they should also be conditional; there must be some plausible actions that Russia can take (or avoid taking) over time to end the sanctions.

Washington must start by spelling out clearly what it views as unacceptable Russian meddling in domestic democratic practice, and which would elicit concrete punitive responses. These red lines would certainly include, for instance, attempts to hack or disrupt voting machines, efforts to steal and disseminate presidential campaign documents, and other activities undertaken by Moscow during the 2016 election. It might, on the other hand, exclude such activities as overt (versus covert or clandestine) propagandizing by the RT and Sputnik networks, which – however unpalatable they may be – represent in the U.S. and Western European context an exercise in free speech.

It also means telegraphing clear timelines for imposition and possible relaxation of sanctions. For sanctions in response to Russian meddling in U.S. elections, the U.S. electoral calendar provides a natural timeline: Stiff penalties on Russia should remain in place until the United States and U.S. allies go through their next election cycles with no unacceptable interference. For the United States, relaxing some sanctions after the 2018 congressional midterms, and all such sanctions after the 2020 presidential elections – if there is no unacceptable Russian interference against the United States or its allies in the meantime – would be a reasonable approach, and one that would require congressional buy-in.

For sanctions imposed in response to Russian intervention in Ukraine, the calculus is more complex. Defining a sensible and sustainable approach requires a hard measure of realism as well as a dose of toughness. The hard reality first: Russia will not divest Crimea in any reasonable time frame; there is too much history, and too much commitment. The realistic toughness: Although Russia will not divest Crimea, that does not mean that the United States or others must or should accept Russian suzerainty over Crimea, just as the United States and some others did not recognize the Soviet Union's absorption of the Baltic States. With these broad caveats, the United States should develop and implement a strategy of effective conditional sanctions in the context of a policy that rejects spheres of influence and forcible conquest and insists on the right of European nations to make sovereign, democratic choices about their alliances and foreign policies.

**5. The United States should respond with military deployments to Russia’s Intermediate-Range Nuclear Forces (INF) Treaty violations.**

Analogous to its response to disclosures of Russian interference in the U.S. 2016 presidential election, Putin’s approach to Russian INF violations has been to deny the allegations. Also analogously, the United States should respond meaningfully to the treaty violations as it has belatedly begun to do regarding the election meddling.

The United States has been remiss in not responding in a significant way thus far to Russian violations of the INF Treaty. It is not, however, too late to do so. This report recommends three steps.

First, the United States should continue to strengthen its non-nuclear long-range strike capabilities in Europe and support partners’ efforts to do so as well. The deployment of U.S. F-35s with extended-range attack missiles (the Joint Air-to-Surface Standoff Missile – Extended Range, or JASSM-ER) and the sale of these aircraft and missiles to NATO allies were useful steps that should be built upon.

Second, the United States should work with NATO allies to continue to improve missile defenses in Europe. The European Phased Adaptive Approach (EPAA) deployments in Romania and those planned for Poland in 2018 were initially intended to counter a potential missile threat from Iran. Given Russia’s violation of the INF Treaty, however, the United States and NATO

should now make clear that EPAA deployment along with other missile defense capabilities will have a role in deterring Russia’s use of missiles in Europe and mitigating its nuclear saber rattling. As was always the case, the EPAA deployments in Romania and Poland will have no ability to engage Russian intercontinental ballistic missiles (ICBMs) aimed at the United States and so do not impact the stability of the strategic nuclear balance.

Third, the United States should again deploy nuclear-tipped sea-launched cruise missiles, a follow-on to the Tomahawk Land Attack Missile-Nuclear (TLAM-N), on attack submarines (SSNs). Such a deployment is allowed under the INF Treaty and would strengthen extended deterrence both in Europe and in Northeast Asia. The TLAM-N was retired by the Obama administration starting in 2010 – not for ideological reasons, but because it was nearing its end of life and did not appear to be essential to the U.S. nuclear posture. With Russia’s increased belligerence and greater reliance on nuclear weapons, as well as with North Korea’s continued advancement on the nuclear and missile fronts, the situation has changed. Deploying a follow-on to TLAM-N, with stealth features based on the Long-Range Standoff (LRSO) nuclear cruise missile being developed for U.S. long-range bombers, would provide the United States with a highly survivable theater nuclear capability.

This follow-on to TLAM-N would fill a deterrence gap by adding a survivable and credible theater nuclear deterrent that complements dual-capable fighter-bombers (potentially vulnerable both to pre-emptive attacks on air bases and to advanced air defenses) and dual-capable long-range bombers (the use of which, if in response to theater use of nuclear weapons by Russia, would require the United States to be the first to engage in homeland-to-homeland nuclear strikes). In addition, as discussed below, deploying a TLAM-N follow-on system on SSNs will promote strategic stability by providing a useful hedge against Russian or Chinese advances in anti-submarine warfare, by increasing the number of nuclear weapons-capable U.S. submarines by nearly fivefold.<sup>3</sup>

It would be strongly preferable to retain the INF Treaty, which eliminated entire classes of missiles from both sides. However, if Russia does not return within a limited time (perhaps an additional two years) to abiding by the treaty, then the United States, working closely with its NATO allies, should consider additional measures beyond those outlined above, including deployment of additional non-nuclear strike and missile defense capabilities.



*The deployment of U.S. F-35s with extended-range missiles was an important first step toward building NATO’s non-nuclear long-range strike capabilities in Europe. (U.S. Air Force/Tech. Sgt. Ryan Crane)*

## **6. The United States should aim to build positive cooperation with Russia in areas of mutual interest.**

Even as Washington sustains sanctions on Moscow and takes steps to bolster the U.S./NATO military posture, U.S. leaders should actively develop areas of cooperation with Russia. Such attempts must proceed from a posture of realism; Washington should not treat Moscow as an implacable enemy but must also avoid naiveté about Russian intentions and behavior. In recent years, the two countries have enjoyed a measure of success in cooperating on Iran nuclear diplomacy, counterterrorism, climate change, civilian space activities, and some arms control measures, including the New START treaty, even while opposing each other on a variety of other fronts.

There will remain areas in which the United States will have an interest in working with Russia. Washington will need Russian support for (or abstention on) further U.N. Security Council-imposed sanctions on North Korea, and likely other threats to international peace and security that come before the council in the future. The two might productively cooperate in some areas of the Arctic, in civilian space activities, in diplomatic negotiations over Syria's future, and in the Global Initiative to Combat Nuclear Terrorism, which Russia and the United States co-chair.

American policymakers should continue their efforts to disabuse Moscow of two erroneous beliefs that continue to mar the potential for more productive bilateral relations. Russian officials routinely assert that the United States seeks the ability to conduct a successful first nuclear strike in order to coerce Russia.<sup>4</sup> (We return to this topic in a later section.) They also hold that Washington fomented “color revolutions” in Ukraine and Georgia, and stirred up election protests in Moscow, in part as a rehearsal for fomenting regime change in Russia.<sup>5</sup> Neither of these assertions is true, and yet they undermine the possibility of stable relations.

As U.S. leaders take steps in these areas, they should do so in the full knowledge of Russian bad behavior – not just in other arenas, but at times in the areas in which cooperation is sought. While Washington should seek Russian cooperation at the U.N. on North Korea, for example, a Russian state-owned firm recently provided Pyongyang with a second internet link.<sup>6</sup> Russian cooperation in diplomacy and distribution networks can help the U.S. effort in Afghanistan, but Moscow has been reported to actively support the Taliban.<sup>7</sup> (We believe that these assertions regarding Russian actions are accurate and that such actions are largely intended to constrain U.S. unilateral actions perceived to be contrary to Russian interests, including by exacerbating security challenges faced by the United States.) A long-term solution to the Syrian civil war is currently unthinkable without Russia's participation, but Moscow's military support for Bashar al-Assad – and Russian forces' relentless attacks on civilians and the non-ISIS opposition to Assad – has helped make a resolution ever more remote.<sup>8</sup>

### **There will remain areas in which the United States will have an interest in working with Russia.**

As a result, the areas of meaningful cooperation between Washington and Moscow will be highly circumscribed for the foreseeable future, and domestic politics in each country are likely to remain highly unfavorable to a thaw. So while American leaders should continue to press a modest, positive agenda, they should put greater priority on deterring bad behavior and avoiding a slide toward crisis and conflict.

## **Managing Pathway #2**

AVOIDING SLIDING DOWN SLIPPERY SLOPES OF ESCALATION

**T**oday both the U.S. and Russian militaries rely heavily on information technology and space systems to support their operations, including for communication, command, and control – and more broadly for the functioning of weapons platforms, munitions, and logistical support systems. In the event of a crisis or looming conflict, early and extensive attacks on cyber and space systems would be extremely attractive to both sides. Such attacks could give substantial military advantage to the side that moves first, and at relatively low risk. Because such attacks could be (at least initially) covert, the other side’s response may be delayed and uncoordinated. And because such attacks could be designed to have few direct casualties, the other side might have limited response options that did not appear highly escalatory.

As a result, if armed conflict looks at all likely, there will be strong incentives to “go early” with offensive cyber and counterspace operations to negate the other side’s military. If these early cyber and space attacks succeed, the first-mover could gain a huge military and coercive advantage, potentially without having produced any casualties. This course of action could appear very low risk to the attacker, who may discount the possibility that the attacked side would undertake military strikes in response to fried computers on its territory and dead satellites in outer space. As a result, large-scale cyber and space attacks – perhaps before a kinetic conflict even starts – may well be perceived as a low-risk, high-payoff move for both sides.

However, such early cyber and space attacks, while seeming attractive to the attacker, could also pose grave risks: Three interrelated dynamics would likely grease the slippery slope of conflict and increase prospects for rapid and potentially unintended escalation.

First, even very limited initial attacks in cyberspace and/or outer space could have unintended and undesired cascading effects on civilian critical infrastructure. These effects could occur within cyberspace, for example, if either or both sides had clandestine cyber implants designed to disrupt or destroy the other side’s military systems and supporting critical infrastructure, which would almost certainly include significant civilian infrastructure. Because of the significant and growing civilian dependency on outer space, similar dynamics would occur if either or both sides had significant counterspace capabilities (whether in orbit or terrestrial). The implications of such cyber or space attacks could include a loss of civilian GPS, disruption of civilian air traffic control, crippling of power plants or distribution networks, and so on.

Second, in both the cyber and space domains there is a real possibility that attacks by a rogue internal actor, a third-party nation-state, or (particularly in cyberspace) a terrorist group could result in conflict escalation between the United States and Russia. The risk of misattribution could grow dramatically in crisis, when each side may believe it is imperative to respond quickly in order to send a strong signal and prevent further attacks.

Third, and of critical importance, to the extent that an attacker’s initial cyber and space operations were successful in negating a substantial fraction of the other side’s military, the attacked side could fear that it now faces a dire use-or-lose situation regarding its remaining military strike capabilities. Because of the extensive reliance of both sides’ nuclear forces on information technology (embedded in systems and for command and control) including space assets, even a cyber or space attack intended to be limited and discrete could induce policymakers on the attacked side to consider using nuclear weapons early in a crisis, or risk losing them altogether.

Our recommendations follow.

### **1. The Department of Defense should devote substantial time and resources to understanding the escalatory dynamics of future great-power crisis and conflict.**

A key challenge associated with understanding the escalation dynamics of a future crisis or conflict between the United States/NATO and Russia involving advanced cyber and space weapons revolves around the pervasive uncertainty about what capabilities the other side has (or may have in the future). This is amplified by massive uncertainty about what effects attacks by one side in the cyber and (perhaps to a somewhat lesser extent) space domain may have on the other side’s military operations.

Any conflict between NATO and Russia would pose not only great dangers, but also great uncertainties – despite the fact that each side has a reasonably good estimate of the military capabilities of the other side. These uncertainties are likely to be amplified dramatically by the extensive employment of cyber weapons, which in many cases must remain clandestine in order to be effective, and which may propagate within and between complex information technology networks and will affect human perceptions in ways impossible to predict. Similarly, in the space domain, while some offensive weapons may be overt, many may be covert, and the propagating effects of any disruptions are difficult to forecast.



A second key difference between the escalation dynamics for cyber and space as compared with the nuclear arena is that unlike the detonation of even a single nuclear weapon, attacks in the cyber and space domains may be quite subtle and not directly produce casualties even if they are highly impactful. Part and parcel of this potential for subtlety is a requirement for highly tailored offensive cyber and space capabilities. To reduce the risks of doing either too little in response to a cyber or space attack (and so inviting further attacks) or doing too much (and thereby unintentionally accelerating momentum to a more costly war), it is essential that both sides consider carefully in advance of crisis or conflict where on the “escalation ladder” various cyber and space options should reside – and where the other side believes they reside.

## **Any conflict between NATO and Russia would pose not only great dangers, but also great uncertainties.**

In this novel and evolving situation, tabletop exercises involving dynamic red teams may prove invaluable. Such games will rarely provide closed-form answers, but they can contribute to a better understanding of potential escalation dynamics, the range of potential Russian choices in various crisis and conflict scenarios, and the wide range of possible outcomes when complex interconnected command and control systems come under attack. Such exercises can provide hypotheses that can help drive intelligence collection, refine or develop operational plans, and help develop better-informed approaches to eventual Track 1 engagement.

One of the benefits of tabletop exercises, informed by intelligence regarding what is known as well as reasonable assumptions about what may be the case today and tomorrow, is that they can force senior decisionmakers to confront these challenges realistically. The harsh reality is that the United States must expect Russia (and China) to pursue a wide range of increasingly capable cyber and counterspace capabilities and must act based on this expectation. There are very few areas where mutual restraint would be verifiable (the deployment of space-based missile defense interceptors and anti-satellite weapons are exceptions, as discussed below), and aside from those, the United States will have to make informed assumptions about Russian capabilities and act accordingly.

## **2. The United States should define its desired rules of the road for cyberspace and outer space – not only in peacetime, but also in crisis and conflict – and, where feasible, attempt to reach a common view with Russia (and with China).**

Arms control, as traditionally conducted with verifiable mutual limits on the military capabilities of each side, will have no impact on activities in the cyber domain; there is not a single concept for a verifiable treaty that would promote stability. For outer space, arms control via mutual verifiable limits is also quite daunting, in part because so many military and non-military systems can serve as anti-satellite (ASAT) weapons. However, there are a few viable concepts for verifiable arms control, such as a ban on deploying dedicated ASATs or testing “kinetic kill” ASATs in outer space.

Because there will be significant unresolvable uncertainties regarding each side’s offensive capabilities in cyberspace and outer space, it will be important for each side to have clarity about what it will and will not do, and what it believes the other side may or may not do. Based on such assessments, it may be possible – and would be valuable – to develop a code of conduct relating to behavior in crisis or conflict in cyberspace and outer space.

To that end, the United States should first further develop its own views, then seek consensus with key allies and partners, with whom a common understanding of preferred guidelines for offensive cyber and outer space activities remains lacking. Armed with an allied consensus, Washington should test the degree to which arriving at a common view with Moscow (and, likely separately, Beijing) is possible. Even if a common view is not reached between the United States and Russia, well-prepared bilateral discussions regarding rules of the road in cyberspace and outer space would help clarify where various actions might fall on the escalation ladder, thereby reducing the risks of either side unwittingly taking actions that the other side views as extremely threatening.

The following are two of many possible examples of questions that each side should answer for itself and that could serve as the basis for high-level discussions.

- Is it legitimate for one side to pre-position destructive cyber implants in the military systems of the other side? In its civilian critical infrastructure? (There have been reports that Russia has inserted malware into the U.S. electrical grid, and strong evidence suggests that Russia has used such capabilities against others, including Ukraine.<sup>9)</sup>



- Is it legitimate for one side to maneuver a satellite close to one of the other side's satellites? If not, how far away is acceptable, and what actions are legitimate to enforce any "keep-out zone"?

Each side will need answers to the above questions and many others in order to establish declaratory policy, operational plans, and useful engagement on these issues. Even if such internal evaluation and engagement does not produce a written agreement or treaty, it can help clarify each side's views and reduce the risk of inadvertent war.

### 3. The Department of Defense should prioritize enhanced cyber and space resilience for critical military capabilities.

One of the most obvious and important ways to reduce an adversary's incentive to attack an asset is to reduce that asset's vulnerability to attack. And in fact, over the past several years, the Department of Defense has devoted more attention to the need for weapons and platforms that are resilient against cyberattack and the need for a better-defended and more resilient posture in outer space.

Each of these efforts – cyber resilience and space resilience – is vitally important but has potential to be a money sink. The Department of Defense will need to

set priorities, and even then, the effort to substantially improve cyber and space resilience will be a long-term and costly proposition.

Following a framework established in a Defense Science Board Task Force report on cyber deterrence, the authors suggest the following three priorities.<sup>10</sup>

- First, ensuring the cyber and space resilience of the nuclear triad and the "thin line" of nuclear command, control, and communications that supports it even in a nuclear exchange. This includes, for example, the cyber and physical protection of satellites for early warning (the Space-Based Infrared System, or SBIRS) and secure communications (Advanced Extremely High Frequency, or AEHF). If these systems are not highly secure, then early moves in crisis or conflict could well involve them – SBIRS because of its role in supporting U.S. missile defense and AEHF because of its role in supporting secure communications globally – and raise enormous escalatory risks.
- Second, ensuring the essential cyber and space resilience to support a select but substantial subset of non-nuclear long-range strike capabilities such as the new B-21 bomber and JASSM-ER, and attack submarines equipped with conventional Tomahawk cruise missiles. Having punishing non-nuclear



*The United States should define its desired rules of the road for cyberspace and outer space. This is a critical first step not only toward engaging Russia (and China) on responsible behavior in these domains, but on establishing American declaratory policy and operational plans for these battlespaces. (NASA)*

strike options available for response even after withstanding the other side's best efforts at cyber and space attacks would significantly decrease the incentive to conduct such an attack – without requiring the president to escalate to a nuclear response.

- Third, ensuring that select offensive cyber, and if applicable offensive counterspace, capabilities are both highly cyber-resilient and resilient to counterspace attacks. This posture would give the United States the option to respond in kind – if desired – to an attack limited to cyberspace and outer space. In addition to giving the president more options, symmetric (not necessarily identical) responses are inherently credible and more readily explainable to partners and allies, important to sustaining allied cohesion in crisis or conflict.

#### **4. The United States should improve the cyber resilience of its critical infrastructure.**

Despite increased attention to cybersecurity in recent years by the Obama and Trump administrations, Congress, and the private sector, U.S. critical infrastructure remains highly and increasingly vulnerable to cyberattack. Thus far, the lion's share of the focus on cyber defenses in the United States has been on better protecting confidentiality and privacy (e.g., protection of personal data, intellectual property, etc.). From a national security perspective, even more important is dramatically increasing efforts to defend the very functionality of critical infrastructure.

Cyber offensive capabilities continue to advance faster than defensive capabilities, and in many sectors the emerging “internet of things” is producing a rapidly growing attack surface.<sup>11</sup> For the coming several years, at least, the United States has no realistic prospect of defending its critical infrastructure sufficiently to deny Russia the ability to successfully attack substantial portions of it in cyberspace.

Yet, unlike in the nuclear arena, a focused national effort sustained over a period of many years could fundamentally reduce the cyber vulnerability of at least the most essential U.S. critical infrastructure, including the electrical grid, key elements of the financial sector, water and wastewater systems, and the electoral system. Such an effort must both aim to accelerate the day-to-day improvements in cyber resilience in key

sectors and look toward major technological breakthroughs, such as inherently secure processors that can tilt the offense-defense equation dramatically toward defense. There will be no quick fixes, but with strong leadership from both the public and private sectors, the United States could substantially reduce the cyber vulnerabilities of select portions of its critical infrastructure over the next 10 to 20 years.

There is a long list of potential ways to improve the cyber resilience of critical infrastructure. Systems operators will need to improve users' basic cyber-hygiene and consider systematically avoiding the connection of key control systems to the internet. They may pursue “retro tech” approaches, such as reinstating electro-mechanical switches, as well as new innovations like several types of inherently secure processors that are now in development and testing. In addition, reducing cyber vulnerabilities will involve maintaining backup power for major infrastructure, keeping daily or hourly updated offline backup data (the financial sector's progress here is instructive), and developing protocols for acting when data appears to have been contaminated.

**A focused national effort sustained over a period of many years could fundamentally reduce the cyber vulnerability of at least the most essential U.S. critical infrastructure, including the electrical grid, key elements of the financial sector, water and wastewater systems, and the electoral system.**

The ability to mitigate the impact of cyberattacks through a portfolio of actions – including well-practiced and resourced plans for rapid reconstitution – will reduce the other side's incentives to attack and the potential escalatory impact if it does so. Such investments will promote strategic stability and, importantly, reduce the risk that the most essential U.S. critical infrastructure will be damaged or held hostage by rogue nations or terrorist groups.



*U.S. Secretary of State Rex Tillerson meets with Russian Foreign Minister Sergey Lavrov in Washington in May 2017. (U.S. Embassy and Consulates in Russia)*

## **5. The United States should reopen diplomatic and military lines of communication with Russia.**

Since the Russian intrusion into Ukraine, the United States and Russia have substantially reduced high-level contacts, just as tensions have increased. Along each of the pathways described in this paper, the possibility of inadvertent escalation in a crisis is real and rising. Such dangers are compounded by changes in Russian and American doctrine and policy.

Russia's military doctrine, for instance, calls for "non-nuclear deterrence," or the use of political, diplomatic, economic, informational, and other non-military measures to impose its will on foreign adversaries.<sup>12</sup> Although non-nuclear deterrence shifts emphasis away from military operations, it carries significant risk, as

These dynamics put a premium on prudent bilateral communications. Even during the darkest days of the Cold War, key U.S. and Soviet personnel were able to communicate; indeed, such practiced channels were essential to the peaceful resolution of the 1962 Cuban missile crisis. Current law prohibits bilateral military cooperation with Russia but, as Chairman of the Joint Chiefs General Joseph Dunford has pointed out, maintaining military communications is permissible.<sup>14</sup>

Maintaining military communications is also desirable. Senior-level diplomatic and military engagement with potential adversaries is not a gift to them; it is a common-sense way to reduce the risks of miscommunication and avoidable conflict. Notwithstanding how difficult U.S.-Russian relations are today, the United

## **U.S. strategists are grappling with the question of how to reinforce NATO's eastern frontier without diminishing Moscow's sense of its own security.**

evidenced by increased U.S.-Russian tensions in the aftermath of Russian interference in the 2016 presidential election. By the same token, U.S. strategists are grappling with the question of how to reinforce NATO's eastern frontier without diminishing Moscow's sense of its own security. A recent war game, for instance, demonstrated that American efforts to bolster deterrence in NATO east by pre-positioning troops and materiel during a crisis could be interpreted by Moscow as a prelude to Western aggression.<sup>13</sup>

States should work to reopen channels of communication, including diplomatic as well as military-to-military ones. Secretary of State Rex Tillerson and Dunford have taken some initial steps – for example, tactical deconfliction in Syria – but much more is needed. Track 2 (nongovernmental) and Track 1.5 (some governmental participation in nongovernmental) events are essential complements to such Track 1 discussions, though they are no substitute.

# Managing Pathway #3

SUSTAINING U.S.-RUSSIAN STRATEGIC STABILITY



**F**rom the preceding sections of this report, it is clear that in coming years U.S.-Russian relations will offer many opportunities for crisis, and potentially for armed conflict. While we believe the prospect of outright conflict remains low, the potentially catastrophic implications of even such low-probability events highlight the central importance of taking steps where possible to buttress strategic stability.

Both the United States and Russia are recapitalizing their nuclear delivery systems. For the most part, these new capabilities will not undermine strategic stability, as they represent replacements for existing systems. Some Russian systems, particularly single-warhead mobile ICBMs, are stabilizing because of their increased survivability.

However, two aspects of Russia's strategic nuclear modernization efforts represent potential threats to strategic stability. First, Russia's increased reliance on silo-based multiple independent re-entry vehicle (MIRV) ICBMs is problematic. Each missile with its six to ten independently targetable warheads provides more firepower than the same number of single-warhead missiles for counterforce strikes against U.S. silo-based ICBMs, and as a result, is an attractive target for U.S. counterforce strikes. Even if a U.S. first strike is unthinkable to Americans, it clearly is not unthinkable to Russian leaders. While Russia's MIRVing of silo-based ICBMs may be seen as a way to provide greater payload capacity for overwhelming U.S. missile defenses and to engender more nuclear "bang for the buck," these deployments increase instability in any future crisis. During the SALT II and START treaty negotiations, the United States pursued reductions in the Soviet Union's most capable heavy ICBM, the 10-plus warhead SS-18, and in START II treaty the United States and Russia agreed to ban MIRVed ICBMs (Russia withdrew from START II in 2002 after the U.S. withdrawal from the ABM treaty. Acting unilaterally to promote strategic stability, in its reductions under the current New START treaty the United States de-MIRVed all of its Minuteman III ICBMs to a single warhead.

Second, and of even greater concern, Russia has reportedly developed a nuclear-powered torpedo carrying a multimegaton warhead laced with cobalt, intended to render the U.S. west coast uninhabitable.<sup>15</sup> This weapon, known as Status-6, raises legal and moral issues. The use of such an indiscriminate weapon would violate the law of armed conflict, and its deployment appears highly unethical,<sup>16</sup> creating a risk of unauthorized or inadvertent use. If such a system were tied into the "regular order" of Russian nuclear command and

control, it might be alerted and potentially pre-positioned in the event of crisis or war. On the other hand, if Status-6 had its own unique nuclear command and control, one must wonder whether this system has the same safeguards against unauthorized use. Given the lack of Russian transparency about the weapon, the security and surety of its command and control, and its potentially devastating capabilities, U.S. leaders may feel obliged to develop the capabilities to defeat it. If they do so, Russian leaders may take this U.S. action as strongly reinforcing evidence that the U.S. leaders do not accept mutual vulnerability as the basis for strategic stability.

In addition, a few experts, including former Secretary of Defense William Perry, have argued that nuclear-tipped cruise missiles are destabilizing "because they can be launched without warning and come in both nuclear and conventional variants."<sup>17</sup> Russia deploys air- and sea-launched nuclear cruise missiles, while the United States currently deploys only air-launched nuclear cruise missiles. We do not subscribe to this argument: Nuclear (or non-nuclear) cruise missiles are ill-suited for leading a major counterforce attack because a large-scale attack involving them would almost certainly be detected and the attacked side would have hours to execute its response.

### **Even if a U.S. first strike is unthinkable to Americans, it clearly is not unthinkable to Russian leaders.**

In any event, the larger challenges to U.S.-Russian strategic stability in the coming decades will come not from nuclear systems, but from a range of non-nuclear systems. As discussed at length in our previous report, the deployment of increasingly advanced cyber, space, missile defense, long-range conventional strike, big data analytics, and autonomous systems have the potential to threaten both sides' nuclear retaliatory strike capability, thereby undermining strategic stability.

To evaluate strategic stability, the United States needs to think in terms of scenarios involving large-scale strategic nuclear attack. Thankfully, such scenarios are extremely difficult to imagine occurring today. But the United States must consider what could happen in the coming years, after the deployment of significant new nuclear and non-nuclear capabilities, and potentially in the context of poor U.S.-Russian relations that have deteriorated into severe crisis or conflict.

Just as strategic stability is not being undermined by a single new technology, but rather by the integration of a range of new technologies, so too an integrated program is needed to buttress strategic stability between the United States and Russia in the coming years and decades. This program must consider changes in both nuclear and non-nuclear systems and in both nuclear and non-nuclear strategies.

In formulating its integrated program, the United States must contend with a range of threat actors, not only Russia. It must also deal with a range of threats from Russia, including, for example, gray-zone aggression or a conventional attack on Europe, not only the threat of nuclear attack. So although strategic stability is a critically important goal, the United States must be willing to take actions that will incur risk to that stability in order to buttress security in other areas. (An example is modest increases in U.S. national missile defenses in response to increasing North Korean nuclear weapons and long-range missile capabilities.)

Our recommendations follow.

### **1. The United States should reaffirm nuclear “mutual vulnerability” as the basis for strategic stability vis-à-vis Russia.**

There is nothing inherently desirable about a situation of mutual vulnerability, or equivalently “mutually assured destruction” (MAD). Far from it: No nation would leave itself vulnerable to swift and total destruction by an adversarial nation, if it had a choice. Over five decades, however, both American and Russian (previously Soviet) leaders understood that they did not have a choice: There was no foreseeable combination of offensive and defensive capabilities that could render the other side’s nuclear second strike anything less than utterly devastating. This understanding informed both sides’ approach to deployments of (extensive and diverse) offensive and (very limited) defensive weapons systems.

Given the ongoing, dramatic advances in military capabilities enabled by new technologies, it must be asked whether this long-standing MAD condition should remain the basis of strategic stability between the United States and Russia. Indeed, this question of what stability looks like in the future must be answered first, and only then can one determine how to preserve it. There are four theoretically possible alternatives to stability based on MAD.

The first theoretical alternative to MAD is stability based on mutual defense dominance, in which neither side could be confident in being able to impose

unacceptable damage on the other side. Mutual defense dominance is implausible for the foreseeable future. Neither side has a realistic path forward to near-perfect missile defenses that could overcome the countermeasures, defend against suppression attacks, and deal with the diversity (air and missile) and sheer scale of a concerted large-scale nuclear attack by the other side.

The second theoretical alternative to MAD is stability based on unilateral defense dominance, in which one side (only) has the capacity to deny the other side the ability to hold at risk its population and critical assets, while simultaneously having the capability to destroy the other side if it so desired. This alternative is the form of strategic stability that the United States seeks vis-à-vis North Korea or (if it were to occur in the future) a nuclear-armed Iran. If unilateral defense dominance were feasible to achieve, and to maintain, either the United States or Russia would feel compelled to do so. However, if either Russia or the United States believed it was on the losing end of such a relationship, it would devote enormous resources to rectify the situation so that it could hold at risk the other side. Unless one side decides it no longer wishes to compete, unilateral defense dominance is no more feasible than mutual defense dominance.

The third alternative to MAD-based stability is strategic instability. The most dangerous form of strategic instability would occur if either or both sides believed that a debilitating counterforce first strike, which would largely negate the attacked side’s second-strike capabilities (allowing defenses to “mop up” any ragged retaliation), was feasible. By Russian statements, and by actions including Moscow’s pursuit of the otherwise inexplicable Status-6 program and the Cold War “dead hand” nuclear command and control program, it appears that the Russians may believe that this form of strategic instability – with the United States on top – is already at hand. Few if any Americans believe that this is the case, and indeed this difference of perspective is a source of potential danger.

The fourth theoretical alternative to MAD is what might be called mutually uncertain destruction, or MUD.<sup>18</sup> In such a situation, both sides would lack confidence that they possess an assured second-strike capability, but neither side would be confident that it had a first-strike capability. This situation could arise, for example, if both sides’ nuclear command and control systems were potentially vulnerable to attack in cyberspace and outer space, but neither had great confidence in its own offensive cyber and outer space capabilities. In such a situation, neither side would have strong



incentives to strike first (given the possibility that its first strike would fail and leave the adversary with a potent second-strike capability), while both sides would have incentives to avoid actions that could elicit a first strike (because of doubts about their own ability to strike second). Although a strategically stable MUD situation is theoretically possible at a given point in time, both sides would find this situation highly undesirable, and based on historic worst-case analysis, would fear the worst. Consequently, such a situation would invite arms racing by both sides, as may already be the case in the cyber and space domains.

Our assessment is that the United States and Russia are drifting toward MUD, but must recognize that they are both stuck with MAD for the foreseeable future.

The United States has taken two types of unilateral steps in the past based on the assessment that it was stuck with Russia (and previously the Soviet Union) in MAD. First are steps to ensure that the United States will retain its second-strike capabilities, even under the most challenging scenarios. Historically these steps have included massive U.S. investments in hardening silo-based ICBMs, in keeping strategic bombers on alert during the Cold War (and preserving the option to re-alert since), in developing and deploying air-launched cruise missiles to penetrate air defenses, in deploying highly invulnerable ballistic missile submarines (SSBNs), and in survivable nuclear command and control.

Second are steps that the United States has decided not to take, in order to reduce the U.S. threat to Russian (previously Soviet) second-strike capabilities, and more broadly to preserve stability. Historical examples include the U.S. decision not to pursue the Conventional Trident Modification (CTM), the U.S. policy (to date) to limit its national missile defense capabilities to a level that will not affect Russian retaliatory capabilities, and the U.S. decision in the past to forgo anti-satellite capabilities, including the congressional action in the late 1980s to cancel the F-15 Miniature Homing Vehicle ASAT despite positive test results. The de-MIRVing of Minuteman III ICBMs to a single warhead serves to both reinforce the survivability of U.S. retaliatory capabilities by providing a less attractive target for counterforce attack by Russia and to reduce U.S. counterforce capabilities since each U.S. ICBM poses less of a threat to Russian silo-based ICBMs.

The United States has also attempted to promote strategic stability through bilateral arms control negotiations. Based on its view that MIRVed silo-based ICBMs were a threat to stability, the United States worked to limit “heavy” MIRVed ICBMs in the SALT negotiations.

Based on its view that bombers posed little if any first-strike threat, the United States accepted counting rules under START I and New START that discount bomber weapons; for example, New START treats each bomber as one weapon no matter how many it actually carries. And of course, the United States not only accepted, but aggressively pursued negotiations for, limitations on missile defenses under the 1972 ABM Treaty. Although the United States withdrew from the ABM Treaty in 2002, it has attempted to make clear to Russia that its missile defenses are limited and have neither the scale nor the quality to negate the technologically advanced Russian nuclear deterrent.

## **The United States and Russia are drifting toward mutually uncertain destruction, but must recognize that they are both stuck with mutually assured destruction for the foreseeable future.**

Our considered judgment is that the United States and Russia, for the foreseeable future, must accept MAD as a basis for strategic stability. Neither arms control nor missile (and air) defenses will be able to change this picture for the foreseeable future. Both the United States and Russia should acknowledge this reality and take unilateral and, where feasible, bilateral steps to strengthen strategic stability under MAD.

### **2. The United States should adopt a “triad-plus” strategic force structure.**

Both the United States and Russia have relied for decades on a triad of strategic nuclear forces, consisting of ICBMs, submarine-launched ballistic missiles (SLBMs), and heavy bombers. Unlike the United States, Russia has deployed mobile ICBMs, nuclear-tipped sea-launched cruise missiles (which the United States retired in 2012), and, reportedly, the Status-6 nuclear-powered torpedo. In addition, Russia has a significant number of multi-warhead (MIRVed) ICBMs, including so-called heavy ICBMs that can carry at least 10 warheads each.

The triad has served the United States well for many decades. SSBNs provide the most survivable leg of the triad, and the majority of U.S. strategic warheads accountable under the New START treaty are SSBN-based. Having several hundred deployed silo-based ICBMs provides a hedge against future SSBN

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vulnerability and ensures that any counterforce attack on the United States would require many hundreds of nuclear warheads (with 2:1 targeting of ICBM silos by Russia, some 800 warheads would be required to attack the 400 currently deployed U.S. Minuteman III missiles; even with 1:1 targeting, 400 warheads would be required to do the same<sup>19</sup>). Strategic bombers contribute importantly to the hedge against SSBN vulnerability and, of critical importance, provide a credible capability for limited use in a regional context that does not require missile overflight of Russia or China.

The U.S. triad is necessary, but not sufficient, for the future.

By far the most secure leg of the U.S. triad is the SSBNs carrying multiwarhead D-5 SLBMs. The United States should go forward with the Columbia-class strategic submarine modernization program, as today's Ohio-class submarines will need to be retired, mostly in the 2030s, due to limitations on their hull life. In addition, the United States should continue if not expand funding for the SSBN security program, which attempts to anticipate the most dangerous adversary anti-submarine warfare capabilities of the coming years, in order to spur the timely development of countermeasures.



*An unarmed Minuteman III ICBM launches during an operational test from Vandenberg Air Force Base, California. (U.S. Air Force)*

The principal mission of dual-capable heavy bombers is to provide the capability for high-volume non-nuclear strikes against targets that are mobile, hardened, and deep in the territory of the adversary. Making these bombers also nuclear-capable requires additional costs of about 3 percent (plus some other costs associated with cruise missiles and warheads). For this small price, the bomber leg of the nuclear triad, represented today by the B-2 and the venerable B-52 bombers (remaining B-1B bombers have been modified to carry only conventional weapons), serves four critical nuclear roles: as the central element of the U.S. nuclear umbrella, particularly for Japan and South Korea; as a contributor to extended nuclear deterrence elsewhere, including for NATO; as part of the U.S. hedge against any future challenges to the SSBN leg of the triad; and as a visible signaling capability when Washington seeks to demonstrate resolve or intent. The United States should go forward with the B-21 program (for its conventional capabilities first and foremost, but also for its nuclear capabilities) and should pursue the LRSO missile program, the replacement for the current nuclear air-launched cruise missiles (ALCMs), to ensure that the United States can deliver nuclear weapons by air even against the most advanced air defenses. The United States and Russia (formerly the Soviet Union) have deployed nuclear-tipped air-launched cruise missiles for decades, in order to improve the ability of their bombers to deliver nuclear weapons. Russia, of course, continues to do so, and it would reduce strategic sta-

### **The U.S. triad is necessary, but not sufficient, for the future.**

bility if somehow the United States persuaded Russia to give up its air-launched cruise missiles, given Russian concerns about U.S. ballistic missile defenses. In an era of significantly expanding and improving Russian (and Chinese) air defenses, moving forward with LRSO is a modest investment that will promote, not decrease, strategic stability.<sup>20</sup>

The United States also faces a decision in the next few years on whether and how to replace the 400 currently deployed Minuteman III missiles. The ICBM leg of the U.S. triad is far less important than it was prior to the deployment of highly survivable and capable D-5 missiles and W-88/W-76 warheads on U.S. SSBNs. Today, the most important role of the ICBM leg of the triad is to (along with the bomber leg) hedge against a serious problem in the future with the triad.

The Minuteman III is nearing end of life for key components, and going forward with the currently planned one-for-one replacement of the 400 Minuteman III ICBMs is better than not going forward with an ICBM replacement. However, from a strategic stability perspective, one-for-one replacement of Minuteman III ICBMs in underground silos has a logical fault: It is not necessary if the U.S. SSBN leg remains secure, and it is not sufficient if the SSBN leg does not remain secure.

Instead, the United States should develop a replacement ICBM that is significantly lighter than the 78,000-pound Minuteman III and deploy perhaps 200 to 300 in silos. The United States should also initiate a mobile ICBM research and development program, including prototypes, so that if new sensors and data tools allow a future Russian breakthrough in anti-submarine warfare (ASW), the United States will be prepared to shift weight to a mobile ICBM force. This approach should be no more costly than a one-for-one replacement of Minuteman III ICBMs in silos and would better hedge the U.S. strategic deterrent against ASW breakthrough. (The authors would support moving forward with a mobile ICBM program today, but for three key factors: 1) It is not necessary today and we believe the United States would have sufficient warning if the threat environment changed; 2) Deploying significant numbers of mobile ICBMs would cost far more than a hedge program during a time of severe defense budget pressures; and 3) Getting congressional approval today for a mobile ICBM given the preceding two facts is highly unlikely.)

### **Redeploying nuclear cruise missiles on U.S. SSNs and going forward with a mobile ICBM demonstration program would provide a much stronger hedge against Russian (and Chinese) breakthroughs in anti-submarine warfare than do current U.S. plans.**

The United States should take one further step to hedge against potential SSBN vulnerability, which today would leave the nation with vulnerable silo-based ICBMs and also vulnerable nonalert heavy bombers: A stealthy version of the nuclear Tomahawk missile retired during the Obama administration should be remanufactured based on the LRSO and redeployed on U.S. attack

submarines. We recommended this step in the above section on U.S.-Russian relations, as part of bolstering U.S. extended deterrence of Russian aggression and nuclear intimidation in Europe (and equally important, bolstering the U.S. extended deterrence posture relative to North Korea). Anti-submarine warfare is in large measure a numbers game, and returning nuclear-tipped cruise missiles to SSNs would increase the number of U.S. submarines capable of carrying nuclear weapons from 12 to at least 56 (current plans call for the number of U.S. SSNs to be reduced to 44 in the future).<sup>21</sup>

Redeploying nuclear cruise missiles on U.S. SSNs and going forward with a mobile ICBM demonstration program would provide a much stronger hedge against Russian (and Chinese) breakthroughs in anti-submarine warfare than do current U.S. plans. The additional cost would be modest in the context of spending on U.S. nuclear capabilities, let alone in the context of overall defense spending.

### **3. The United States should develop and deploy non-nuclear hypersonic weapons.**

The United States has decided not to go forward with the least expensive and nearest-term option for conventional prompt global strike, the so-called Conventional Trident Modification, which would have placed conventional warheads on Trident D-5 missiles. This option was rejected by both Congress and the Obama administration specifically because of its potential to undermine strategic stability, in two related ways. First, a country attacked by CTM missiles would not know whether it was about to receive a punishing conventional strike or a devastating nuclear strike until the warhead(s) detonated. In a time of U.S.-Russian crisis or conflict, Russian leaders might assume the incoming warheads were nuclear and act accordingly, delivering a nuclear strike to the United States. Second, in order for the United States to target North Korea with CTM, it would have to either overfly China or Russia or launch on an azimuth toward one or both of these nations. Particularly if a boost-glide vehicle were used, both Russia and China could be concerned that an attack on them might be underway.

At the same time, major improvements in the air defense systems of potential U.S. adversaries (including particularly Russia and China, but also Iran and North Korea) mean that there is a very strong case for the United States to move forward with the development and deployment of non-nuclear long-range hypersonic weapons.

The United States should aim for the “sweet spot” for U.S. non-nuclear hypersonic weapons in terms of

military effectiveness (high), cost (relatively low), potential for high-volume strikes (significant), and impact on strategic stability (low). Conventional Trident Modification and conventional ICBMs would fall well outside of this sweet spot based on the latter three variables. Medium-range ballistic missiles (with and without boost-glide vehicles) and hypersonic cruise missiles, launched from heavy bombers and/or attack submarines, could fall in the sweet spot. Such systems would meet the first three criteria: high military effectiveness, relatively low cost, and significant potential for high-volume strikes. The systems would have a low impact on strategic stability because their infrared and other signatures would be substantially different and distinguishable from those of U.S. nuclear delivery systems (including SLBMs and nuclear-tipped cruise missiles); attacks on one nation would not require overflight of others; and these systems would either not have the range to attack deep into Russia (the case for submarine-based medium-range systems) or would not be able to do so in volume without creating a massive detectable signature (the case for bomber-based systems).<sup>22</sup>

#### **4. The Department of Defense should address vulnerabilities in nuclear command and control systems and review launch-under-attack postures.**

The United States is currently modernizing its nuclear command and control and communications (NC3) system.<sup>23</sup> The physical system includes early warning satellites, ground-based early warning radars, ground-based and airborne command and control nodes, and a number of fixed and mobile information processing systems.<sup>24</sup> It is beyond the scope and classification level of this report to delve into great detail on this modernization effort, the need for which has been recognized for many years.<sup>25</sup> We offer three recommendations.

First, as recommended in a recent Defense Science Board report on cyber deterrence (for which one of us served as co-chair), the Department of Defense must invest significant attention and resources to ensuring that its nuclear forces and NC3 are highly cyber-resilient to a top-tier cyber adversary (i.e., Russia or China). There is currently a “thick-line” set of communications systems intended for day-to-day and crisis support and a “thin-line” set of systems intended to survive and operate in a nuclear attack environment; the thin-line system especially must be also secure from advanced cyberattack.<sup>26</sup> (This report discusses cyber resilience of the broader force in the next section.)

Second, both the U.S. and Russian leadership must understand the reality that their NC3 systems could suffer some degradations in crisis or conflict – some of which may not be due to attacks by the other side. A third-party (state or non-state) actor might gain cyber access or coerce an insider to provide access or conduct sabotage. Accidents and acts of nature can cause service disruptions of some systems. Both sides should ensure that their planning and exercises account for such events.

Third, the U.S. and Russian postures to be prepared to launch ICBMs under attack deserve careful review. As noted above, arguably the most important role of the ICBM leg of the triad is to hedge against advances in adversary anti-submarine warfare capabilities or vulnerabilities in the nuclear command, control, and communications system used to provide launch orders. Thus, the U.S. ability to launch ICBMs under attack hedges against both the vulnerability of SSBNs and the vulnerability of the U.S. NC3 system to destruction or long-term disruption. But planning to launch ICBMs under attack in a situation with uncertain NC3 and an increased possibility of spoofing could be both more challenging to accomplish and have increased risk of launching on false warning. There is not a neat and easy answer here (de-alerting, for instance, remains virtually impossible to verify), but it is important to note that the more the United States hedges through other means, e.g., TLAM-N and mobile ICBM options in the future, the less pressure there will be to launch ICBMs under the warning of attack.

#### **5. The United States should improve its missile defense architecture in response to North Korea, but should forswear space-based missile defense interceptors and urge Russia to do the same.**

Today, neither Russian nor U.S. missile defenses significantly undermine strategic stability. The Moscow anti-ballistic missile system, though intended explicitly to intercept U.S. missile warheads, has only 64 interceptors, so even if it functioned perfectly (and as long as U.S. SSBNs were survivable and in communication) it could only address a fraction of U.S. second-strike warheads. The U.S. Ground-based Midcourse Defense (GMD) system, with 44 interceptors today and plans to grow to about the same size as Russia’s system in response to North Korean ICBM efforts, is similarly too small to make a real dent in Russian retaliatory capabilities.





An S-400 missile system on parade in Moscow in 2009. (Сокорпус)

Yet, as described in detail in our previous report, missile defenses are likely to have a greater impact on stability in the future. There are three distinct issues.

First, both Russia and the United States are deploying large numbers of missile defense interceptors that are less capable than interceptors designed for national defense, but which may be able to provide some additional defensive capability even against ICBMs. For Russia, the current S-400 series of interceptors is being augmented by S-500 interceptors, with an announced plan of adding hundreds of S-500 interceptors by the mid-2020s. On the U.S. side, the planned deployment of hundreds of sea-based SM-3 IIA missiles aboard Aegis-capable ships similarly provides a growing number of interceptors that could play at least some limited role in defense against ICBMs. These interceptors will not have the speed (“velocity at burnout”) needed to provide nationwide coverage of the United States, but if placed in the appropriate locations they could provide defense of some U.S. territory. It is questionable whether SM-3 IIA interceptors – or for that matter the ground-based interceptors that make up the current U.S. national missile system – would have much (if any) capability against advanced Russian missile defense countermeasures, but it is near-certain that Russian leaders would fear that this was the case.

Second, both Russia and the United States are continuing research on directed energy systems, which are showing increasing promise. The United States has deployed directed energy systems on ships for defense against unmanned aerial vehicles (UAVs), cruise missiles, artillery, and short-range rockets. Russia’s current capabilities are less certain. In any event, with advances in solid-state laser technology and other areas, the potential is real for ground-, sea-, and air-based lasers to be of concern for strategic stability in the next two to three decades. If so,

the platforms that carry such directed energy systems (ground, sea, or air) are likely to become priority targets for early attack in a conflict.

Third, space-based missile defenses, which may involve the deployment of thousands of kinetic kill vehicles and/or a small number of directed energy systems, will likely become feasible in the coming two to three decades. Though such systems’ ability to defeat a large-scale nuclear attack is open to question, there is no question that such systems could serve as highly capable anti-satellite weapons. Indeed, if either side placed itself on the path to deployment of such systems, the other side would have enormous incentives to pre-empt before the systems could be in place.

Our recommendations are as follows.

First, as North Korea continues to grow its nuclear-tipped ICBM capabilities, the United States should continue to grow its missile defenses. Adding another 40 ground-based interceptors for a total of 84 (or for that matter, adding 60 for a total of 104) will not change the U.S.-Russian strategic balance. In addition, the United States should evaluate how it might use SM-3 IIA interceptors in defense of Guam, Hawaii, and other regions of the United States where Aegis-capable ships are likely to be based or deployed. Indeed, if SM-3 IIA interceptors could contribute to the defense of at least some parts of the United States from North Korea by adding diversity and different interceptor capabilities, and do so at reasonable cost, it is difficult to see how U.S. leadership could justify not proceeding. Russia will have the ability to defeat the system with countermeasures, suppress the system by attacking key nodes, and circumvent the system with cruise missiles given that the United States does not have a national air/cruise missile defense system.

Second, the United States should continue to press forward with directed energy systems for defensive purposes, including research and development on potential applications for defeating long-range missiles. Priority should be given to helping to deal with the immediate challenge of negating North Korean long-range and medium-range missiles – likely by deploying directed energy systems on manned or unmanned aircraft. It is not at all clear that there is a plausible deployment of directed energy systems that could have anywhere near the capability to engage advanced missiles and re-entry vehicles – let alone that such systems could be cost-effective and survivable – but research exploring the limits of the possible will help inform future decisions – and also help improve U.S. counter-directed energy capabilities.

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Third, the United States should forswear space-based missile defense interceptors and directed energy systems, strongly urge Russia to do the same, and pursue a bilateral agreement with Russia (and separately, a bilateral agreement with China) to this end. Because of the massive and immediate threat such systems would pose to American satellites and their essential support to warfighting – and potentially to early warning and secure communications satellites that are vital to the U.S. nuclear deterrent – any Russian deployment of space-based missile defense interceptors or lasers would pose an immediate and unacceptable threat.<sup>27</sup> The impact of space-based interceptors or directed energy systems on strategic stability could be far greater than the impact of medium-range missiles deployed in Cuba by the Soviet Union, which provoked the 1962 Cuban missile crisis. The United States would need to consider closely whether to act to prevent such a deployment – and should expect that Russia would do the same.

#### **6. The United States should regularize strategic stability talks and seek to extend the New START treaty by five years.**

Senior members of the U.S. and Russian governments met in Finland to discuss the future of strategic stability in early September 2017.<sup>28</sup> Russian Deputy Foreign Minister Sergei Ryabkov reported afterward that the two sides had agreed to continue implementing the New START treaty. Little else was reported about the subject of the U.S.-Russian dialogue. This meeting was an important first step toward a regular Track

1 dialogue on strategic stability issues in the coming years. The U.S. and Russian governments should sustain efforts in this regard.

At the same time, however, in view of the volatility of U.S.-Russian relations at this time, and recognizing that circumstances may delay or derail Track 1 efforts, two parallel activities make sense. First, U.S. and Russian stakeholders should pursue Track 2 and Track 1.5 dialogues on strategic stability, such as the U.S. National Academy of Sciences effort now underway. Second, each country should undertake a serious consideration of what viable outcomes it should pursue and what outcomes the other side might accept in the course of dialogues. Internal deliberations and Track 1.5 and 2 discussions should also proceed on norms relating specifically to cyberspace and outer space; because of the importance of these two domains to escalation management and strategic stability, fruitful work will require each side (and hopefully both together to some extent) to take into account the broader context of strategic stability.

Regarding arms control, the United States and Russia should agree to extend the New START treaty by five years. Its verification provisions, including data exchange and 18 inspections per year, provide transparency and predictability, thereby serving strategic stability by reducing the propensity of each side to rely on worst-case assessments. It would not be helpful at present to press for further reductions in force levels, as having some extra margin above the bare minimum force levels each side thinks it needs will help to buffer the impact of new military capabilities as they are deployed.



*U.S. Undersecretary of State Thomas Shannon, pictured here, met with Russian Deputy Foreign Minister Sergei Ryabkov for strategic stability talks in September 2017. (U.S. Mission to the European Union)*



# Conclusion

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In the coming years, U.S.-Russian relations will likely have their ups and downs, and realistically the United States must recognize that the downs may be acute. Depending on both sides' actions, there may be a number of opportunities in the coming years for severe crisis or even military conflict. As a result, comprehensive steps to maintain bilateral strategic stability are crucial.

If adopted by the Trump administration and its successors, a clear-eyed and strong American approach to U.S.-Russian relations, as recommended in this report, will protect U.S. and allied interests. If the U.S. approach is also articulated clearly and is consistent over time, it will reduce the risk of crisis or conflict arising from Russian miscalculation. Whatever approach the United States takes toward Russia, how things go along our first pathway of U.S.-Russian relations will depend of course on choices by Putin and, in the (perhaps distant) future, by other Russian leaders.

Whatever the course of future U.S.-Russian relations, both sides' extensive military dependencies and vulnerabilities in cyberspace and outer space will act as an accelerant to escalation in crisis and conflict. Implementing systematic, prioritized, and large-scale American investment efforts in cyber and space resilience will bolster the U.S. position in crisis and reduce Russian incentives to act early and aggressively in cyberspace and space. Other steps recommended in this report, including clarifying and articulating U.S. views regarding cyber and space norms, will further reduce the risks of rapid unintended escalation. These efforts will take time, resources, and strong leadership.

Finally, while even more-fractious relations with Russia would be unfortunate, and the potential for rapid escalation of crisis or conflict fraught with danger, a nuclear exchange between the United States and Russia would be an unmitigated and unparalleled calamity. The probability of such an extreme outcome is low today. But it is important to recognize that risks today are low in part because of decades of U.S. investment in diverse and survivable nuclear delivery systems, as well as thoughtful steps taken (e.g., deMIRVing Minuteman III ICBMs) and not taken (e.g., not deploying the Conventional Trident Modification). Continued unilateral U.S. actions, and where feasible and in U.S. interests select bilateral agreements with Russia (e.g., the retention and extension of the New START treaty), are essential to bolstering strategic stability and reducing the risks of an avoidable nuclear catastrophe.

## Endnotes

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