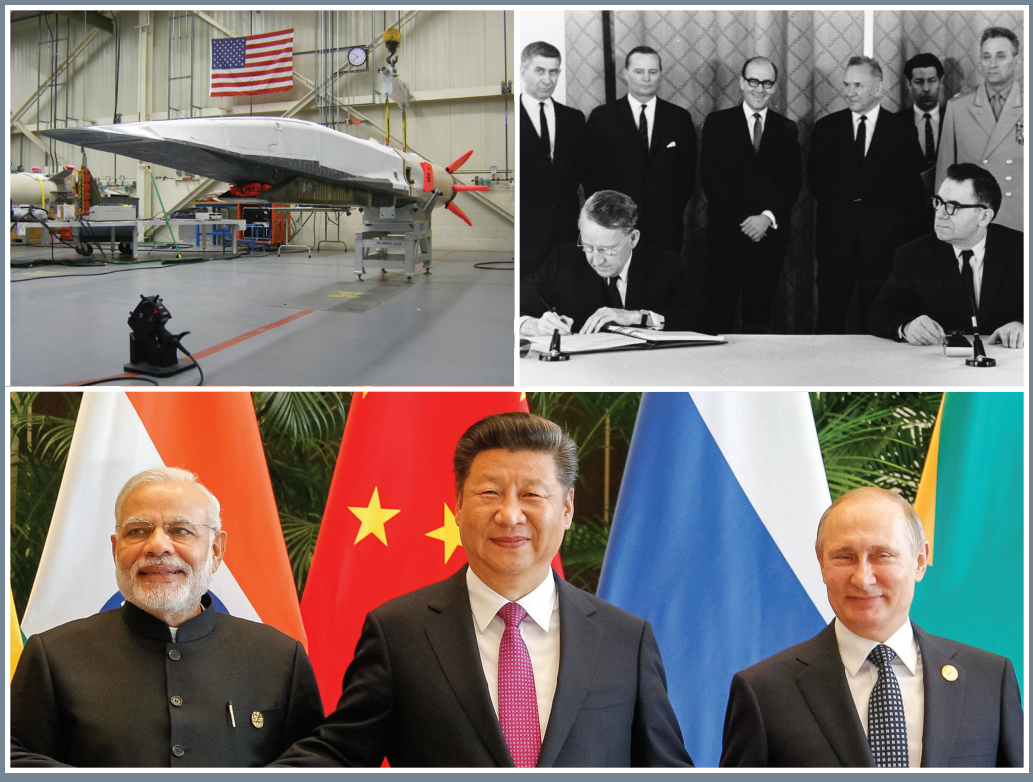
Meeting the Challenges of the New Nuclear Age:

Emerging Risks and Declining Norms in the Age of Technological Innovation and Changing Nuclear Doctrines



Nina Tannenwald and James M. Acton

With an Introduction by
Jane Vaynman

AMERICAN ACADEMY OF ARTS & SCIENCES

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Cover images: top, left to right: The X-51 Waverider (photo courtesy U.S. Air Force); U.S. Ambassador Llewellyn E. Thompson, left, signs the Nuclear Non-Proliferation Treaty as Soviet Foreign Minister Andrei A. Gromyko watches in Moscow, Russia, on July 1, 1968; standing, left to right: Embassy Political Counsellor David Klien, U.S. Embassy Scientific Attaché Christopher Squire, U.S. Embassy Political Officer and Chief Translator Alexander Akalovsky, Soviet Premier Alexei N. Kosygin, unidentified Soviet translator, and Soviet Defense Minister Andrei Grechko (AP Photo). Bottom: Prime Minister Narendra Modi, President Xi Jinping, and President Vladimir Putin at the 2016 G20 Summit in China (by Foto: Beto Barata/PR; CC by 2.0, via Wikimedia Commons).

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Acknowledgments

The project on Meeting the Challenges of the New Nuclear Age focuses on the dangers and opportunities presented by an increasing complex world shaped by nine states that possess nuclear weapons. The initiative is concentrating its efforts in three areas: 1) a rapidly shifting geopolitical environment and its impact on relations between and among the states that now make up a multipolar nuclear world; 2) the technological frontiers being crossed in cyber, nonnuclear strategic weaponry, space, bioweapons, and enhanced missile defense and their implications for strategic stability, nuclear norms, and nuclear concepts, such as extended nuclear deterrence; and 3) in managing this new nuclear world, the role and prospects of nuclear arms control as well as alternative mechanisms for governing and reducing the prospects for nuclear use. In the first phase of the project, we have focused on some of the core questions generated by the changes in this new environment.

This second publication, *Meeting the Challenges of the New Nuclear Age: Emerging Risks and Declining Norms in the Age of Technological Innovation and Changing Nuclear Doctrines*, examines two specific features that have come to characterize the current nuclear order: fast-paced technological innovation in nuclear and nonnuclear weapons and rapidly deteriorating nuclear norms.

We are extremely grateful to Jane Vaynman for providing a deeply analytical introduction to this publication and to Nina Tannenwald and James Acton for sharing their knowledge and expertise in their fine essays. We also want to acknowledge the extraordinary commitment, talent, and expertise of the members of the project's working group.

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Introduction

Jane Vaynman

The risk of nuclear use has increased, not only because of growing tensions with North Korea and Russia, but more broadly due to shifts in several underlying drivers of nuclear conflict—or, conversely, nuclear restraint. The authors of the two essays in this occasional paper, the second set prepared for the American Academy of Arts and Sciences project on "Meeting the Challenges of the New Nuclear Age," identify two such drivers: deteriorating norms and increasingly complex security relationships. Nina Tannenwald's paper, "The Great Unraveling: The Future of the Nuclear Normative Order," argues that norms of nuclear non-use have deteriorated, both with respect to a global nuclear order and within relationships among nuclear states. James Acton's paper, "Technology, Doctrine, and the Risk of Nuclear War," focuses on the evolution of several strategic relationships, including the rise of multipolarity, crisis escalation, and the blurring of lines between nuclear and nonnuclear capabilities.

The authors come to similar conclusions for different reasons, and taken together their views suggest a rather bleak picture, with limited opportunities for reducing risks. They observe some of the same phenomena in the contemporary security environment and agree about the implications. Changes in nuclear doctrines, for example, increase the possibility of nuclear use as nuclear weapons become more "usable," both normatively and practically. Indeed, the authors would likely agree with one another's views, having chosen merely to focus on different dimensions of a multifaceted problem. However, there are also notable contrasts in these two approaches to understanding nuclear risks. While Tannenwald considers positions taken by nonnuclear states, Acton's sense of the "nuclear order" focuses on relationships between the nuclear powers. Perceptions and understandings play a central role in both analyses, but for Tannenwald expectations may be informed by normative beliefs and ethical considerations, while Acton focuses on states' inabilities to observe fully an adversary's intentions and capabilities. These views are not contradictory and taken together reveal a broader picture for considering nuclear use dynamics.

Tannenwald discusses a series of related nuclear norms: deterrence, non-use, nonproliferation, non-explosive-testing, and disarmament. These norms are contested and face challenges from domestic politics, evolving nuclear doctrines, and international confrontations. Of these, the deterrence and disarmament discussions raise the most interesting questions. The deterrence regime argument holds that nuclear weapons are only for the purposes of deterrence, not for use in conflict. Of course, deterrence only works with a credible threat

of use, but here the threat is made under the condition of extreme existential risk, with use only in retaliation to a strike against the state. Under this kind of deterrence-only norm, the United States and the Soviet Union took steps to lower incentives for first strike and diminish the chances of use due to misperception. In some ways, the deterrence norm is a mild version of a norm of non-use. Tannenwald identifies a decline in traditional understandings of deterrence, which implies a higher likelihood of use.

The ethical opposition to nuclear weapons, articulated today by proponents of disarmament and the participants of the humanitarian consequences movement, holds that nuclear use is illegitimate on moral grounds, which leads to a fundamental objection to any role for nuclear weapons, including deterrence. Though the paper also separates non-use (or a nuclear taboo norm) from the "disarmament norm," they are deeply related, as Tannenwald notes, "the spread, strengthening, and internalization of the taboo have long been seen as a step on the route to disarmament." Tannenwald observes a curious duality in the current status of these interlaced norms. In many respects, there is a decline in commitments to non-use evident in increased references to nuclear use by political leaders and the lowering of nuclear use thresholds in military doctrines. But the Treaty on the Prohibition of Nuclear Weapons signed in July 2017 also suggests that some nonnuclear states support a normative push for disarmament. An implication of Tannenwald's assessment is that in the near future we might see an even sharper global contestation between ideas of nuclear weapons as effective and even prestigious military tools and nuclear weapons as morally illegitimate.

Tannenwald's discussion of deterrence norms alongside moral opposition to nuclear weapons and disarmament suggests a tension between various options for next steps. On one hand, Tannenwald argues in favor of a global no-first-use commitment and a recommitment by nuclear states to deterrence. On the other hand, Tannenwald also takes seriously the calls for disarmament and seeks "frank conversations about the morality of deterrence." Can states commit to a deterrence norm and also question the ethics of that norm? Does a commitment to no-first-use contradict efforts to delegitimize nuclear weapons, or is it a step toward that ultimate direction?

Tannenwald's paper suggests, though does not explicitly argue, that a commitment to disarmament is in some ways in opposition to a milder non-use norm consistent with deterrence. There may be an important trade-off between these approaches: eventual disarmament could delegitimize the risk-reducing elements of nuclear deterrence today, but a renewed commitment to deterrence could make arguments for eventual disarmament increasingly difficult to make.

James Acton attributes the increased possibility of nuclear use to material rather than normative drivers. Acton identifies multipolarity and crisis escalation as the two key situations in which changes in technology and doctrine are today creating increased risk. His paper does not draw an explicit link between them, raising some questions as to whether global conditions have effects on crisis stability. The specific characteristics of contemporary military technology, which

blur the line between nuclear and conventional capabilities, and the way these technologies have been incorporated into military doctrines come into play specifically when considering the potential for crises to escalate to nuclear use.

At the end of his essay, Acton notes, "the drivers behind the growing likelihood of nuclear use are a mix of the old and the new." The statement is a good reflection of many of the dynamics he identifies in his paper. First, the triangular nature of today's multipolar relationships increases the dangers of rivalries that are far from new. India and Pakistan continue to respond to one another's buildup in nuclear arsenals and missiles, but now China has become increasingly attentive to India's efforts. U.S. nuclear strategy remains bilaterally oriented toward Russia on one hand and China on the other, but international and domestic pressures for further rounds of nuclear reductions increasingly seek to include both Russia and China.

The problem of crisis escalation is likewise a mix of past and present, newly exacerbated by dual conventional and nuclear technologies. Acton's assessment of the doctrinal and technological shifts suggests that states' efforts effectively to threaten and coerce with conventional means—perhaps even decreasing the reliance on nuclear weapons—actually increase the potential for escalation to nuclear use. The military doctrines of several nuclear states have intentionally focused on creating escalation through conventional weapons. However, conventional escalation could be misperceived as entering the nuclear domain. Even more importantly, some of these conventional strategies intentionally threaten assets that are also relevant for nuclear capabilities. Acton cites the examples of command-and-control centers, early-warning satellites, and nuclear forces colocated with conventional ones. The increasing development of dual-use delivery systems also exacerbates the escalation problem, as states could mistake conventional capabilities for nuclear ones and interpret military moves by an adversary as far more aggressive nuclear signals.

Despite the pessimism of both Tannenwald's and Acton's essays, they suggest several areas that warrant further thinking, including arms control focused on restraining escalatory behaviors, the intersection of nonnuclear technology and norms, and domestic politics as a limiting factor for debate on nuclear weapon policy.

First, the authors are highly skeptical about prospects for future arms control, but other elements of their essays suggest we should perhaps revisit arms control ideas even at a time when they are not politically popular. Tannenwald's proposal for a no-first-use regime, especially one adopted through international agreement, is a form of arms control that focuses on establishing rules about allowable behaviors. Compliance with a no-first-use commitment might involve openness about certain types of deployments, or demonstrations of doctrinal integration of the no-first-use concept in military planning. Tannenwald's analysis of the decline of arms control actually suggests that perhaps efforts should focus on designing arms control that promotes common understandings and expectations, while avoiding the kinds of restraints on capabilities or on freedom to develop technologies that often raise domestic political opposition.

While efforts to restrain behaviors will likewise face an uphill battle, and the United States has indeed rejected commitments to impose international laws on domestic policies, the potentially different constellations of domestic support and opposition could create opportunities for such agreements that are at the very least worth exploring.

In addition to measures Acton proposes on internal organizational reform of governments and militaries, his paper inspires ideas for cooperative efforts that likewise focus on specifying behaviors rather than limiting capabilities. Acton's analysis implies the challenge is not always one of organizational failure to recognize a perceptions problem, but rather one of states having strategic interests that create opportunities for misperception (and consequently nuclear escalation) as they address other legitimate security concerns. Acton notes specific cases of possible misidentification of nuclear versus conventional capabilities, and in doing so he also points out specific opportunities to mitigate misperception. If, for example, there is a potential inadvertent escalation problem at the deployment stage of Chinese DF-26 missiles, then this is an area in which the United States and China could pursue confidence-building measures and information exchange. While even such limited arms control may founder for a host of reasons (including the technical and political difficulties Acton notes), the identification of how a mutually disadvantaged misperception could occur should motivate at least an attempt to design cooperative responses.

Second, it is clear scholars and policy-makers will have to contend with the challenge of how norms develop, or perhaps fail to develop, around emerging nonnuclear military technologies that increase the risk of escalation into nuclear conflict. Two factors may undermine the development of restraint norms in this space. As Acton discusses, states are developing nonnuclear technologies in response to perceived security threats and with use in mind, and the technology is integrated into doctrine and deployment. Increasing the risk of escalation may be an unintentional—or even intentional—externality of these capabilities, but neither negates its purpose within military strategy, making "non-use" norms unlikely to take hold. Further, there are many diverse ideas on how escalation could occur under new scenarios that involve long-range, high-precision conventional missiles, autonomous weapons, or cyber capabilities. The lack of consensus is unsurprising, but also inhibits both norm development and norm promotion by actors who might seek to mitigate escalation risks. Efforts at developing common understanding about even a small subset of nonnuclear technology could aid in the growth of norms around high-risk behaviors or communication during crises involving these capabilities.

Finally, thinking about mitigating risks of nuclear use need not be mired in the present. The current domestic political opposition to arms control, or as Tannenwald puts it, a "disdain," is not necessarily the sign of a long-term trend. Throughout the Cold War and even before, some arms control agreements took years to negotiate, and long periods elapsed without agreements at all, only to have opportunities emerge later. Even without current negotiations, the New Strategic Arms Reduction Treaty (New START) and the Iran nuclear

deal are relatively recent in the time frame of arms control developments, and both have substantial domestic support even in the face of political opposition. Looking ahead, President Donald Trump would not be the first world leader to oppose international cooperation efforts, who is replaced later by someone who favors them. Though it would be an unlikely bet, Trump would also not be the first leader to start with an anti-agreements policy but eventually come to see cooperation as beneficial. At the same time, the papers in this collection suggest warnings that domestic support for both nuclear restraint and international cooperation could decline even further, perhaps if nuclear weapons become entrenched in nationalist movements. The challenges to both normative and material nuclear orders identified in these essays are unlikely to decline in the short term. Thinking about ways to mitigate the risks of nuclear use should likewise seek to move beyond today's political environment.

The Great Unraveling: The Future of the Nuclear Normative Order

Nina Tannenwald

With the end of the Cold War, nuclear weapons appeared to recede as a central feature of security relations among the nuclear powers. Responsible political leaders widely accepted that these were weapons of last resort. Concern shifted to nonproliferation and terrorist acquisition of nuclear weapons. The Nuclear Nonproliferation Treaty (NPT) was given a permanent extension in 1995, while the United States and Russia embarked on dramatic reductions in their nuclear arsenals.

Today, however, a new nuclear era is emerging, one of multiple nuclear powers, intersecting rivalries, increased regional tensions in Europe and Asia, and new technological arms races in both nuclear and nonnuclear weapon systems. In this emerging nuclear era, the key norms that have underpinned the existing nuclear order—most crucially deterrence, non-use, and nonproliferation—are under stress. A new norm of disarmament has emerged but it is deeply contested, while other norms, such as arms control, are disappearing altogether. Most disturbingly, nuclear weapons are being relegitimized in states' security policies.

It is useful to think of the current nuclear order in terms of two components. First is what we might call the *global nuclear order*, centered around the nuclear nonproliferation regime and debates over the justice and fairness of the regime's rules. It is essentially about the "haves" versus the "have-nots." The problems of the global nuclear order have received significant attention in recent years, in part because of the politics of inequality at NPT review conferences and the popularity of disarmament as an issue.[1] The second component is the *nuclear order among the nuclear powers*, centered around relationships of deterrence and issues of nuclear stability. These relations have received less sustained political attention, in part because the number of nuclear powers is small,

1. See Steven E. Miller, *Nuclear Collisions: Discord, Reform and the Nuclear Nonproliferation Regime* (Cambridge, Mass.: American Academy of Arts and Sciences, 2012); Toby Dalton, Togzhan Kassenova, and Lauryn Williams, eds., *Perspectives on the Evolving Nuclear Order* (Washington, D.C.: Carnegie Endowment for International Peace, June 6, 2016); and Jane Boulden, Ramesh Thakur, and Thomas G. Weiss, eds., *The United Nations and Nuclear Orders* (Tokyo: United Nations University Press, 2009).

strategic stability issues are complex and often technical, and most of the rest of the world wants to do away with deterrence, not preserve it. Yet the existing nuclear powers are at the core of the nuclear normative order. What they do has tremendous consequences for strengthening or weakening norms of restraint.

This essay takes stock of the current nuclear normative order, focusing on existing, declining, and emerging norms, especially among the nuclear powers. What challenges to norms, concepts, and doctrines does the new nuclear era pose? Under pressure from changing military technology and increasing geopolitical tensions, the global nuclear normative order is beginning to unravel. Deterrence and disarmament are both deeply contested, while some nuclear-armed states are lowering the threshold for nuclear use. The technological, political, and ethical status of deterrence is being brought into question. Although the norm of nonproliferation enjoys wide support, the nonproliferation regime itself suffers a legitimacy deficit. Further, little agreement exists on key concepts such as strategic stability or the value and purpose of arms control—once a central but now a largely moribund if not discredited practice.

This is a troubling state of affairs, with serious consequences for the risk of nuclear war. Below, I review this situation, beginning with some conceptual framings. I conclude with suggestions for how the nuclear powers might renew a commitment to norms of nuclear restraint.

EXPLAINING NORMATIVE CHANGE: THEORETICAL PERSPECTIVES

Norms are shared expectations about behavior.[2] They can be highly formalized, as in a codified legal regime (for example, the nonproliferation norm of the NPT), or they can be de facto norms, such as the norm of nuclear non-use. Norms depend for their maintenance and strengthening on some degree of behavioral compliance, which may differ for different norms. Scholars debate how much noncompliance will unravel a norm. Noncompliant behavior does not necessarily invalidate a norm, but over time increasing noncompliance does erode norms.[3]

Several theoretical perspectives on international relations provide a framework for understanding change in the nuclear normative order. In a realist view, norms reflect the existing distribution of power. Norms exist but are weakly institutionalized and unevenly enforced ("organized hypocrisy").[4] Norms will shift when the underlying distribution of power shifts. In this view, nuclear

2. Peter J. Katzenstein, ed., *The Culture of National Security* (New York: Columbia University Press, 1996).

3. Martha Finnemore and Kathryn Sikkink, "International Norm Dynamics and Political Change," *International Organization* 52 (4) (Autumn 1998): 878–917.

4. Stephen D. Krasner, *Sovereignty: Organized Hypocrisy* (Princeton, N.J.: Princeton University Press, 1999).

norms will change as new nuclear powers rise and old ones decline, or with the development and spread of new military technologies. In the realist view, the nuclear nonproliferation regime is eventually doomed to fail because it cannot accommodate the rise and fall of great powers (e.g., India will never get to join the NPT as a nuclear power).[5] Stable deterrence, in this view, is a direct function of secure second-strike capabilities and operates on the basis of prudential, not rule-following, behavior.

Liberal institutionalism would expect a little more staying power in the current normative order, especially in the more highly institutionalized areas such as the nuclear nonproliferation regime. Liberalism holds that norms can become institutionalized and embedded in legal rules and associated practices. Institutions and norms facilitate cooperation by stabilizing expectations, facilitating reciprocity, and monitoring cheating. The nuclear nonproliferation regime is the most highly institutionalized of the nuclear regimes and one of the most widely adhered to security regimes. It institutionalizes explicitly a number of nuclear norms—among them nonproliferation and peaceful uses of nuclear energy—and provides mechanisms for monitoring compliance. The recent Iran nuclear deal has bolstered the credibility of the nonproliferation regime as an enforcement mechanism that can respond to violations. Apart from the now-eroding U.S.-Russian arms control relationship, however, no comparably institutionalized "deterrence" or "disarmament" regime exists among the nuclear powers. Hence we might expect that shared understandings about deterrence and disarmament are weaker, and that norms in this area would be more contested and more easily eroded by changing behavior and new technology.

A third perspective, constructivism, emphasizes the role of ideas and identities, and the multiple roles norms play both substantively and symbolically. To analyze the nuclear normative order, three concepts are useful: normative incoherence, normative inconsistency, and normative contestation. *Normative incoherence (or conflict)* refers to a situation in which norms fundamentally conflict; for example, disarmament norms versus norms that associate nuclear weapons with great power status. *Normative inconsistency* refers to norms applied unevenly to states (e.g., India and Israel are treated differently from Iran and North Korea). Finally, *normative contestation* refers to different interpretations of the meaning of a particular norm (e.g., competing interpretations of the Article IV provision of the NPT on the "right" to peaceful nuclear energy) or of the validity or legitimacy of a norm.[6]

Most norms are contested to some degree, and all normative orders contain contradictions and inconsistencies. Severe contradictions, however, can point toward normative unraveling.

5. T. V. Paul, "The Systemic Bases of India's Challenge to the Global Nuclear Order," *Nonproliferation Review* 6 (1) (Fall 1998): 1–11.

6. Ramesh Thakur, "Conclusion: Normative Contestation, Incoherence and Inconsistency," in *The Responsibility to Protect: Norms, Laws and the Use of Force in International Politics* (London: Routledge, 2011).

TWO ETHICAL VIEWS OF NUCLEAR WEAPONS

Two competing moral arguments about nuclear weapons have shaped the debate from the beginning of the nuclear era. The first is that *technology itself is value neutral*; it depends on how you use it. This is the view of U.S. military planners, who have argued repeatedly, going back to the 1950s, that weapons technology itself is neither good nor bad. Rather, it depends on how it is used. As a National Security Council Planning Board report argued in May 1953, the atomic weapon "differs only in degree from other weapons," and moral judgments "should be on the same basis as for other weapons capable of destroying life and inflicting damage."[7] For the U.S. military, use is shaped (in principle) by just war principles of proportionality and discrimination, that is, the laws of war.

Such principles have informed the evolution of U.S. nuclear weapons toward smaller, more discriminating weapons, in the explicit belief that weapons that cause less collateral damage are more ethical. Such concerns drove Secretary of Defense James Schlesinger's efforts in the 1970s to move toward smaller nuclear weapons, and motivated arguments in the wake of the 1991 Gulf War in favor of mini-nukes.[8] More recently, similar concerns informed the Obama administration's modernization plans. The secretary of defense's 2013 *Report on Nuclear Employment Strategy of the United States* holds explicitly that "all plans [for use of nuclear weapons] must be consistent with the fundamental principles of the Law of Armed Conflict. Accordingly, plans will . . . apply the principles of distinction and proportionality and seek to minimize collateral damage to civilian populations and civilian objects."[9] The B61-12 warhead currently under development by the Pentagon will have variable yields and more precise targeting. Former Under Secretary of Defense for Policy James N. Miller, who helped develop the modernization plan before leaving his post in 2014, emphasized the ethical advantages of these upgrades. As he stated in an interview, "Minimizing civilian casualties if deterrence fails is both a more credible and a more ethical approach."[10]

The paradox, of course, is that by making a weapon more ethical you also make it more usable. This makes deterrence more credible, but it also makes the arms more tempting to use first, rather than simply in retaliation. This is a prime example of normative conflict in the deterrence regime, in which more ethical weapons put pressure on the long-standing norm of nuclear non-use.

7. "Interim Report by the Ad Hoc Committee of the NSC Planning Board on Armaments and American Policy," May 8, 1953, in *Foreign Relations of the United States, 1952–54, National Security Affairs, Vol. II, Part 2*, ed. Lisle A. Rose and Neal H. Petersen (Washington, D.C.: Government Printing Office, 1984), 1153, 1160.

8. Thomas W. Dowler and Joseph S. Howard II, "Countering the Threat of the Well-Armed Tyrant: A Modest Proposal for Small Nuclear Weapons," *Strategic Review* 19 (4) (1991).

9. Office of the Secretary of Defense, U.S. Department of Defense, *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.*, June 12, 2013.

10. William J. Broad and David E. Sanger, "As U.S. Modernizes Nuclear Weapons, 'Smaller' Leaves Some Uneasy," *The New York Times*, January 11, 2016.

The alternative ethical view is that nuclear weapons themselves are inherently immoral. This is the view of the anti-nuclear movement going back to the 1950s and of today's Global Zero movement, the Vatican (since the 1980s), and the humanitarian impact campaign at the United Nations. It is also the sentiment behind the nuclear taboo, a normative inhibition on any first use of nuclear weapons. President Obama's remarks at Hiroshima in May 2016 highlighted this ethical perspective. In the first-ever visit to Hiroshima by a sitting U.S. president, a highly symbolic moment, Obama called on the international community to pursue a nuclear-free world and stated that preventing the catastrophe of nuclear war demands a "moral revolution" as well as "progress in human institutions."[11]

In this view, nuclear weapons, even "small" ones, are taboo. The risk of escalation is ever-present, and use would open a Pandora's box of more use. As President John F. Kennedy stated in a meeting on NATO policy in December 1962, "once one resorts to nuclear weapons one moves into a whole new world. There is no way to prevent escalation once the decision is made to employ nuclear weapons."[12] Thus *any* use of nuclear weapons, no matter how small, would be morally unacceptable. In this view, there is no such thing as an ethical nuclear bomb. In the long run, even deterrence itself is also immoral, because relying on a policy that threatens to kill millions of innocent people is fundamentally wrong, while the risk of accidental or intended use can never be eliminated.

These two competing moral views continue to shape debates over nuclear weapon policy today. On one hand, nuclear threats that are considered more moral are more credible but put pressure on the norm of non-use. On the other hand, as defenders of deterrence argue, abolishing nuclear weapons might lead to the return of war between major powers and the vast human suffering that would accompany the conflict. In short, even well-intentioned ethical impulses can lead unwittingly to actions that undermine important elements of nuclear restraint.

THE EXISTING REGIME OF NUCLEAR RESTRAINT

Since the 1960s, the existing nuclear normative order has been built around three key norms of nuclear restraint: deterrence, non-use, and nonproliferation. Under Barack Obama, new support for a norm of abolition emerged, taken up enthusiastically by civil society groups and nonnuclear states.[13] These norms of

11. "Remarks by President Obama and Prime Minister Abe of Japan at Hiroshima Peace Memorial," May 27, 2016, https://obamawhitehouse.archives.gov/the-press-office/2016/05/27/remarks-president-obama-and-prime-minister-abe-japan-hiroshima-peace.

12. Memorandum, "NATO and Nuclear Matters," conversation between President John F. Kennedy and the Foreign Minister of Denmark, U.S. Department of State, December 4, 1962. Thanks to William Burr for this document.

13. Lawrence Freedman, "Disarmament and Other Nuclear Norms," *Washington Quarterly* 36 (2) (2013): 92–108; Moritz Kütt and Jens Steffek, "Comprehensive Prohibition of Nuclear Weapons: An Emerging International Norm?" *Nonproliferation Review* 22 (3–4) (2015): 401–420.

restraint constitute alternative pathways to the prevention of nuclear war. While they reinforce each other in some instances (e.g., extended deterrence helps prevent proliferation), they conflict in others (a robust norm of non-use might undercut the credibility of deterrent threats). Supplementing these are several additional norms: a no-explosive-testing norm, a norm of "peaceful uses" or civil nuclear cooperation, and an emerging norm of nuclear security. For reasons of space I do not address the latter two in this essay.

THE UNDERMINING OF THE DETERRENCE REGIME

Mutual deterrence between nuclear-armed states has been viewed as the core nuclear security relationship. During the Cold War, mutual vulnerability to catastrophic nuclear destruction gave the ideologically opposed superpowers one overarching shared interest: preventing all-out nuclear war. U.S. and Soviet leaders eventually arrived at the view that the overwhelming destructive power of nuclear weapons meant such weapons were useful for retaliatory deterrence only, not for coercive threats or actual nuclear warfighting purposes (although force structures did not follow). Debates over the requirements of stable deterrence were ongoing for decades, however, and were never resolved. Analysts doubted whether the nuclear states would share ideas of deterrence in the same way. Academic critics argued that the uncertainties of deterrence provoked arms races, led to arsenals capable of massive overkill, and provoked risky behavior, and that nuclear war during the Cold War was avoided largely by sheer luck.[14]

Nevertheless, the idea that nuclear weapons were for deterrence, not use, was an important accomplishment. In an effort to avoid miscalculation and unintended nuclear use, U.S. and Soviet leaders sought to stabilize deterrence by embedding it in arms control and other security cooperation agreements. The U.S.-Soviet arms control process, including the Strategic Arms Limitation Treaty (SALT), Anti-Ballistic Missile (ABM) Treaty, and NPT, along with confidence-building measures, helped to codify the practice of strategic deterrence between the superpowers and to reinforce that the primary goal of national security policy in the nuclear age was avoidance of nuclear war.[15] While the SALT process was ultimately unsuccessful in reining in the strategic arms race, the 1972 ABM Treaty was essentially a no-strategic-first-use agreement. Both sides agreed they would leave themselves undefended. The ABM Treaty thus depended on a mutual expectation that neither side intended to initiate a nuclear attack. In short, while the regulative effect of the ABM Treaty was to ban ABMs, the *constitutive* effect was to codify and legitimize deterrence rather

14. Richard Ned Lebow and Janice Gross Stein, *We All Lost the Cold War* (Princeton, N.J.: Princeton University Press, 1994).

15. Joseph S. Nye Jr., "Nuclear Learning and U.S.-Soviet Security Regimes," *International Organization* 41 (3) (Summer 1987): 371–402; Condoleezza Rice, "SALT and the Search for a Security Regime," in *U.S.-Soviet Security Cooperation: Achievements, Lessons, Failures*, ed. Alexander L. George, Philip J. Farley, and Alexander Dallin (New York: Oxford University Press, 1988).

than use as the appropriate role for superpower nuclear weapons. This helped to enshrine a "norm" of deterrence. Joseph Nye described the U.S.-Soviet deterrence relationship as a "partial security regime."[16]

Today, the hard-won U.S.-Russian security relationship is unraveling. The George W. Bush administration's withdrawal from the ABM Treaty in 2002 cleared the legal pathway for U.S. deployment of missile defenses in Europe, in the face of strong Russian objections. It also marked a unilateral retreat from an important shared understanding about deterrence, with nothing to replace it. Deep disagreements over U.S. missile defenses are now a major source of tension in the deteriorated U.S.-Russian relationship, along with mutual trading of charges of violation of the INF Treaty, nuclear saber rattling from Russia, and disputes over implementation of the 1992 Open Skies Treaty, which promotes transparency.[17] Russia's withdrawal in 2013 from the Nunn-Lugar Cooperative Threat Reduction Program and its boycott of the 2016 Nuclear Security Summit further undermined nuclear cooperation norms.

This retrenchment from traditional understandings of deterrence in the U.S.-Russian relationship is an example of a far deeper problem. Today, deterrence is being challenged from three directions: first, by *technological developments* that entangle nuclear and conventional deterrence and also erode the boundaries between nuclear and conventional weapons; second, by a *political critique* that new nuclear states are irrational and cannot be deterred; and, third, by an *ethical critique*, exemplified by Pope Francis and the humanitarian campaign, that relying on nuclear deterrence has become morally unacceptable.

First, technological advances risk undermining nuclear stability. Stable nuclear deterrence has depended on the survivability of nuclear arsenals against any kind of disarming attack. Today, leaps in missile accuracy and in remote sensing, aided by computers, threaten to undermine the steps countries take, such as hardening and concealment, to ensure the survivability of their nuclear forces.[18] Even ballistic-missile submarines may not be invulnerable in the future.[19] Additionally, new guided bombs, such as the U.S. plans for an advanced cruise missile that would carry a nuclear warhead, and new delivery systems threaten the second-strike capabilities of Russia and China.[20] Together these technological developments undercut the logic of "mutual assured destruction." They make the task of securing nuclear arsenals much more difficult, undermining one of the foundations of stable nuclear deterrence between rivals.

16. Nye, "Nuclear Learning."

17. Steven Pifer, *The Future of U.S.-Russian Arms Control* (Washington, D.C.: Brookings Institution, February 26, 2016).

18. Kier A. Lieber and Daryl G. Press, "The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence," *International Security* 41 (4) (Spring 2017): 9–49.

19. James R. Holmes, "Sea Changes: The Future of Nuclear Deterrence," *Bulletin of the Atomic Scientists* 72 (4) (June 13, 2016): 228–233.

20. William J. Broad and David E. Sanger, "Race for Latest Class of Nuclear Arms Threatens to Revive Cold War," *The New York Times,* April 16, 2016.

New technologies also risk blurring the line between nuclear and conventional weapons. As Thomas Schelling first noted in the 1960s, the nuclear-conventional distinction is the principal qualitative restraint on using the bomb.[21] U.S. leaders have consistently recognized this distinction as the only clear "firebreak" on nuclear warfare. In 1965, Secretary of Defense Robert McNamara's arguments rejecting proposals to build a neutron bomb emphasized the importance of this firebreak. He argued, "While we may find very low yield weapons and enhanced radiation warheads to be of military utility, we should not acquire them simply for the purpose of breaking down the distinction between nuclear and nonnuclear warfare."[22]

Today, the new smaller, lower-yield warheads weaken this distinction.[23] Further, well-intentioned efforts to develop high-tech conventional weapons to replace former nuclear missions may inadvertently increase the risk of nuclear use.[24] The U.S. hypersonic weapon under development, for example, a conventional weapon intended for "prompt global strike," will be so fast and powerful that it will likely spur a nuclear response. The hypersonic glider is explicitly a way to attack China without crossing the nuclear threshold, complicating Chinese leaders' assessment of nuclear retaliation. For normative reasons, strategic conventional weapons are more "usable" than nuclear weapons. However, prompt global strike can encourage preemption or the mistaken perception that it is a nuclear strike. Russian leaders believe, for example, that the United States seeks such weapons for potential use against Russian nuclear forces.[25] For its part, Russia is developing new sea- and air-launched cruise missiles that can carry either nuclear or conventional payloads, and Russia has conducted various military exercises combining conventional and nonstrategic nuclear weapons or dual-capable systems.[26] Pakistan's intention to counter India's conventional military superiority with battlefield nuclear weapons also revives unacceptably risky strategies of the 1980s. These practices increase, rather than reduce, the

21. Thomas C. Schelling, *Arms and Influence* (New York: Praeger, 1977), 264.

22. Nina Tannenwald, *The Nuclear Taboo: The United States and the Non-Use of Nuclear Weapons since 1945* (Cambridge: Cambridge University Press, 2007), 277.

23. The B61-12 bomb is a thermonuclear tactical warhead designed to have four selectable explosive yields: 0.3 kilotons (kt) or 300 tons, 1.5 kt, 10 kt, and 50 kt. See Hans M. Kristensen and Matthew McKinzie, "Video Shows Earth-Penetrating Capability of B61-12 Nuclear Bomb," Federation of American Scientists, January 14, 2016, https://fas.org/blogs/security/2016/01/b61-12_earth-penetration/.

24. James M. Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike* (Washington, D.C.: Carnegie Endowment for International Peace, September 2013); James M. Acton, ed., *Entanglement: Russian and Chinese Perspectives on Non-Nuclear Weapons and Nuclear Risks* (Washington, D.C.: Carnegie Endowment for International Peace, 2017).

25. Elbridge Colby, *The Role of Nuclear Weapons in the U.S.-Russian Relationship*, Task Force on U.S. Policy Toward Russia, Ukraine, and Eurasia White Paper (Washington, D.C.: Carnegie Endowment for International Peace, February 26, 2016).

26. Łukasz Kulesa, *Towards a New Equilibrium: Minimising the Risks of NATO and Russia's New Military Postures* (London: European Leadership Network, February 2016).

risk of nuclear escalation by entangling nuclear and conventional systems and dangerously eroding the firebreak between nuclear and conventional warfare.

These new technologies will require new understandings about how the key concept of strategic stability applies. Strategic stability was always a contested concept. Yet today there are major differences in how the nuclear-armed states think about this key notion and what they believe would enhance or degrade stability in specific issue areas. It is not even clear whether they consider strategic stability to be a useful framework for discussing security cooperation.[27] In short, without new, shared understandings about what would make deterrence stable today, new military technologies may increase the risk of escalation to nuclear use.

Second, deterrence is being discredited politically. Some critics argue that new nuclear states, especially those with extremist elements domestically, are irrational and cannot be deterred. The same applies to terrorists. Therefore, goes the argument, a policy of relying on nuclear deterrence is no longer a viable option and states should pursue more aggressive preventive or preemptive military strategies instead.[28] The George W. Bush administration was a strong proponent of this view, but it was also quite evident in the debate over the Obama administration's Iran nuclear deal, in which some critics argued that Iranian leaders were not rational and therefore nuclear deterrence would never work against a nuclear-armed Iran. On the other end of the political spectrum, some analysts, in trying to make the case for nuclear abolition, have sought to debunk nuclear deterrence as a "myth."[29]

Finally, deterrence is subject to a renewed ethical critique, led by the humanitarian impact campaign and the Catholic Church. The humanitarian campaign, launched at the 2010 NPT Review Conference by nonnuclear states frustrated by the slow pace of disarmament, seeks to highlight the devastating humanitarian consequences of any use of nuclear weapons as a way to delegitimize deterrence and mobilize support for disarmament. The church has long been a powerful moral voice on this issue. In the 1980s, the U.S. Catholic bishops' groundbreaking 1983 pastoral letter focused on the ethics of nuclear use and criticized nuclear deterrence as "morally flawed."[30] At the time, the bishops justified a "provisional acceptance" of possession of nuclear weapons for purposes of deterrence as an "interim" strategy on the way to "progressive disarmament." They opposed first use but did not rule out any conceivable second

27. Nancy W. Gallagher, "Re-thinking the Unthinkable: Arms Control in the Twenty-First Century," *Nonproliferation Review* 22 (3–4) (2015): 480.

28. Joshua Rovner, "After Proliferation: Deterrence Theory and Emerging Nuclear Powers," in *Strategy in the Second Nuclear Age: Power, Ambition, and the Ultimate Weapon*, ed. Toshi Yoshihara and James R. Holmes (Washington, D.C.: Georgetown University Press, 2012), 17–35.

29. Ward Wilson, "The Myth of Nuclear Deterrence," *Nonproliferation Review* 15 (3) (November 2008): 421–439.

30. National Conference of Catholic Bishops, *The Challenge of Peace: God's Promise and Our Response*, *A Pastoral Letter on War and Peace*, May 3, 1983 (Washington, D.C.: United States Conference of Catholic Bishops, 1983).

use. This powerful statement provoked a widespread debate about the ethics of the nuclear arms race and helped undermine public support for the Reagan administration's aggressive nuclear strategies.[31]

Today, more than three decades later, the church finds even deterrence unacceptable and an entrenched obstacle to disarmament. In December 2014, a church policy paper expressed unequivocal rejection of any use, noting "the very possession of nuclear weapons *even for purposes of deterrence* is morally problematic."[32] During his visit to the United States in September 2015, Pope Francis called for a complete prohibition of nuclear weapons, stating, "An ethics and a law based on the threat of mutual destruction—and possibly the destruction of all mankind—are self-contradictory and an affront to the entire framework of the United Nations."[33] The Vatican was an outspoken supporter of negotiations on the Treaty on the Prohibition of Nuclear Weapons that began in March 2017. It signed and ratified the treaty when the latter opened for signature on September 20, 2017. In the eyes of the church and the 121 nonnuclear nations that voted to adopt the treaty, nuclear deterrence is now not only immoral but also illegal. The implications of the prohibition treaty for the nuclear normative order are considered further below.

In sum, technological developments along with political and ethical critiques of deterrence are eroding both the legitimacy and the stability of nuclear deterrence as the core strategic relationship among nuclear-armed states.

THE NORM OF NON-USE

Closely associated with the practice of deterrence is the norm of non-use, or nuclear taboo: a shared belief or expectation that nuclear weapons should not be used. The taboo stems from a powerful sense of revulsion associated with such destructive weapons. No state has used a nuclear weapon in war since 1945. The seventy-two-year tradition of non-use of nuclear weapons is by now the most important feature of the nuclear age. Both self-interest and moral concerns have contributed to the rise of the taboo.

The taboo is an important source of nuclear restraint. Its rise has helped stigmatize nuclear weapons as unacceptable weapons of mass destruction and made it impossible to view them as "just another weapon." This shift in discourse is the single most important legacy of the global anti–nuclear weapon movement. Evidence suggests that this normative stigmatization helped to con-

31. Henry Shue, ed., *Nuclear Deterrence and Moral Restraint: Critical Choices for American Strategy* (Cambridge: Cambridge University Press, 1989).

32. Gerard Powers, "From Nuclear Deterrence to Disarmament: Evolving Catholic Perspectives," *Arms Control Today* 45 (4) (May 2015).

33. "Full text of Pope Francis' Speech to United Nations," *PBS NewsHour*, September 25, 2015, http://www.pbs.org/newshour/rundown/full-text-pope-francis-speech-united-nations/. Some argue that, in adopting this position, the church is moving away from a traditional "just war" ethical framework.

strain U.S. leaders from using nuclear weapons during the Cold War and after.[34] The taboo reinforces mutual deterrence between nuclear powers while undermining the credibility of deterrent threats between nuclear and nonnuclear states.[35] It also has decreased the legitimacy of making nuclear threats, which, until recently, had become both rarer and more veiled.[36]

The nuclear taboo and nonproliferation norms are mutually reinforcing. The taboo—the sense that nuclear weapons are illegitimate—is fundamental to the future of the nonproliferation regime. A prohibition regime cannot be sustained over the long haul by sheer force or coercion, or by physical denial; it requires an internalized belief among its participants that the prohibited item is illegitimate and abhorrent. Further, the NPT's long-term sustainability requires that the prohibition apply equally to all states (not just to some). Conversely, a robust nonproliferation norm helps sustain the taboo. If the norm against possession erodes, this may put pressure on the taboo against use. Further, as William Potter has pointed out, "the NPT is not as explicit as one might like in prohibiting the use of nuclear weapons, or even the threat of their use against nonnuclear states."[37] This has led to repeated calls by nonnuclear states for legally binding "negative" security assurances from the nuclear weapon states and, more recently, to calls for a legal ban on nuclear weapons.

Additionally, the spread, strengthening, and internalization of the taboo have long been seen as a step on the route to disarmament. Should the taboo become sufficiently robust, even the nuclear powers might join a formal legal ban on the use of nuclear weapons, as anti-nuclear states and activists have advocated. Nevertheless, Western powers have sought to associate the taboo with being a "responsible" nuclear power. The taboo could also become an obstacle to disarmament if the nuclear powers maintain that acceptance of the taboo preserves stable deterrence and therefore justifies their (responsible) possession of nuclear weapons into perpetuity.

Today the taboo is under pressure, although the picture is mixed. On one hand, as a norm of the international community, the belief that nuclear weapons should not be used remains widely shared. Efforts continue by civil society and nonnuclear states to further delegitimize the weapons, as the humanitarian impact campaign illustrates. Under the Obama administration, government officials engaged in more public "taboo talk"—explicit reference to the tra-

34. Tannenwald, *Nuclear Taboo.*

35. General Chuck Horner, U.S. commander of the air war in the 1991 Gulf War, said in an interview after the war that the threat to use nuclear weapons against a nonnuclear state was no longer credible. "Oral History: Charles Horner," *The Gulf War: An In-Depth Examination of the 1990–1991 Persian Gulf Crisis*, Frontline/PBS, January 9, 1996, http://www.pbs.org/wgbh/pages/frontline/gulf/oral/horner/1.html.

36. Samuel Black, *The Changing Political Utility of Nuclear Weapons: Nuclear Threats from 1970 to 2010* (Washington, D.C.: Henry L. Stimson Center, August 2010).

37. William C. Potter, *In Search of the Nuclear Taboo: Past, Present, and Future*, Proliferation Papers no. 31 (Paris: IFRI Security Studies Center, Winter 2010), https://www.ifri.org/en/publications/enotes/proliferation-papers/search-nuclear-taboo-past-present-and-future.

dition or norm of non-use and the obligation to uphold it. U.S. officials regularly stated in their nuclear speeches that "it is in the U.S. interest and that of all other nations that the nearly 65 [now 72]-year record of non-use of nuclear weapons be extended forever."[38] This language was also in the Obama administration's 2010 *Nuclear Posture Review Report*. In an important summit statement in November 2010 between the United States and India, President Obama and Prime Minister Manmohan Singh stated they "support strengthening the six decade-old international norm of non-use of nuclear weapons."[39] In May 2016, U.S. Defense Secretary Ash Carter pushed back publically against Russian President Vladimir Putin's nuclear saber rattling, saying it "raises troubling questions about Russia's leaders' commitment to strategic stability, their respect for norms against the use of nuclear weapons, and whether they respect the profound caution that nuclear-age leaders showed with regard to brandishing nuclear weapons."[40]

These statements serve as valuable public affirmations of the importance of non-use. Likewise, the historic visits to Hiroshima by Secretary of State John Kerry and President Obama in spring 2016 were important symbolic pilgrimages to remind the world of the catastrophic destructive power of nuclear weapons and the need for "never again."[41] According to officials at Hiroshima's Peace Memorial Museum devoted to the atomic bombings, Obama's visit substantially boosted attendance at the museum, illustrating a significant demonstration effect.[42]

Nevertheless, there are troubling signs the taboo is weakening, a trend that began well before President Donald Trump. Especially worrisome is the renewed salience of nuclear weapons in the NATO-Russia confrontation, in which Russian leaders have begun to employ a frightening rhetoric of nuclear use. Aware of Russia's conventional military inferiority vis-à-vis NATO, Russian leaders talked openly about putting nuclear weapons on alert during the Crimea operation in 2014, deployed nuclear-capable missiles to Kaliningrad in 2016, and have even made nuclear threats against NATO member states.[43] NATO is responding by strengthening its deterrent and promoting its plans for ballistic

38. Acting Under Secretary for Arms Control and International Security Rose Gottemoeller, "Priorities for Arms Control Negotiations Post–New START," February 21, 2013, U.S. Department of State, http://www.state.gov/t/us/205051.htm.

39. "Joint Statement by President Obama and Prime Minister Manmohan Singh of India," November 8, 2010 (Washington, D.C.: Government Printing Office, 2010).

40. Secretary of Defense Ash Carter, "Remarks at EUCOM Change of Command, Stuttgart, Germany, May 3, 2016," U.S. Department of Defense, http://www.defense.gov/News/Speeches/Speech-View/Article/750946/remarks-at-eucom-change-of-command.

41. Felicia Schwartz, "John Kerry, in Hiroshima, Reaffirms Need to Curb Nuclear Weapons," *The Wall Street Journal*, April 10, 2016.

42. Interview with Yasuyoshi Komizo (Hiroshima Peace Culture Foundation chairperson), July 2017.

43. Julian E. Barnes, "NATO Accuses Russia of Loose Talk on Nuclear Weapons," *The Wall Street Journal*, February 13, 2016; Andrew E. Kramer, "Russia Speaks of Nuclear War as U.S. Opens Missile Defense System," *The New York Times,* May 12, 2016.

missile defenses, which only continues the cycle.[44] Igor Ivanov, a former Russian foreign minister who now runs a Russian government think tank, said in March 2016, "The risk of confrontation with the use of nuclear weapons in Europe is higher than in the 1980s."[45] Former U.S. Secretary of Defense William J. Perry has been airing similar concerns.[46]

The lack of caution in brandishing nuclear weapons has become most alarming in the U.S.–North Korean relationship, in which the exchange of nuclear threats and bombastic rhetoric between Trump and North Korean leader Kim Jong-un has risen to frightening levels. North Korean leaders' penchant for threatening preemptive strikes suggests that they think nuclear weapons are usable. Trump's impulsive and reckless wielding of threats to "totally destroy" North Korea has significantly escalated tensions on the Korean peninsula, raising the risk of miscalculation and inadvertent nuclear war. Some analysts think a U.S. first strike on North Korea is imaginable.[47]

The recklessness of this situation defies belief. When the world's leading democracy demonstrates willful disrespect for the long-standing norms of nonuse and nonproliferation (during the campaign Trump suggested that Japan and South Korea should get nuclear weapons of their own), it sets a particularly damaging example. If there is a silver lining, it is that Trump's behavior has likely put a sizeable dent in the "orientalist" discourse that non-Western nuclear states are irrational while Western states are "responsible" nuclear powers.[48] Alarmed members of Congress have called for review of the American president's authority under U.S. law to decide unilaterally on nuclear use. Analysts, the media, and public discourse increasingly frame Trump as childlike or mentally ill, and therefore—like Kim Jong-un—"outside the pale" and not someone whose views or behavior establish a precedent. Such a framing will be essential to preserving the nuclear taboo going forward.

44. Samuel Charap and Jeremy Shapiro, "U.S.-Russian Relations: The Middle Cannot Hold," *Bulletin of the Atomic Scientists* 72 (3) (2016): 150.

45. Alix Culbertson, "European Nuclear War Imminent as Russia Relations Break Down," *Express* (London), March 19, 2016.

46. William J. Perry, "The Risk of Nuclear Catastrophe Is Greater Today than During the Cold War," *Huffington Post*, https://www.huffingtonpost.com/william-jperry/nuclear-catastrophe-risk_b_9019558.html.

47. David Nakamura and Anne Gearan, "In U.N. Speech, Trump Threatens to 'Totally Destroy North Korea' and Calls Kim Jong Un 'Little Rocket Man,'" *The Washington Post*, September 19, 2017; Mark Fitzpatrick, "The Increasing Likelihood of War with North Korea," *Politics and Strategy* blog, International Institute for Strategic Studies, November 8, 2017, https://www.iiss.org/en/politics%20and%20strategy/blogsections/2017-6dda/november-c6ba/the-likelihood-of-war-with-north-korea-4ea5.

48. Hugh Gusterson, "Nuclear Weapons and the Other in the Western Imagination," *Cultural Anthropology* 14 (1) (February 1999): 111–143.

Nuclear Doctrines that Lower the Threshold for Use

The lowered threshold for use is also reflected in the nuclear-armed states' nuclear doctrines. Doctrines are the set of ideas about how nuclear weapons would be used to achieve outcomes. Many of the doctrines today increase the salience of nuclear weapons in security policy, blur the line between nuclear and conventional weapons, and emphasize "early" use. While the U.S. 2010 *Nuclear Posture Review* narrowed the conditions under which the United States would use nuclear weapons, even under Obama Pentagon planning remained largely mired in outdated Cold War nuclear strategies that emphasize first-strike capabilities. The Trump administration's *Nuclear Posture Review,* released on February 2, 2018, reverses important progress of the Obama era nuclear policy.[49] It increases the role of nuclear weapons in deterring nonnuclear attacks, requests new nuclear warheads that make use seem easier, and seeks to integrate nuclear and conventional forces to facilitate nuclear warfighting. The latter will blur the important "firebreak" between nuclear and conventional weapons that serves as a main barrier to nuclear war. Further, the review advocates with breathless enthusiasm a costly, full-speed-ahead nuclear arms race with Russia and China. While not everything the review calls for will come to pass, the Trump *Nuclear Posture Review* signals a renewed, dangerous embrace of the risks of nuclear weapons and that the United States has abandoned aspirations for leadership on reducing nuclear dangers.

The picture elsewhere is equally grim. Analysts debate whether Russia plans to rely on a so-called "escalate to de-escalate" strategy—a limited nuclear strike involving a few low-yield nuclear weapons in response to large-scale aggression with conventional weapons by NATO. On the positive side, it is likely Russia's threshold for nuclear use will rise as its long-range conventional precision-strike capabilities improve.[50] However, Russia, Pakistan, and likely North Korea believe nuclear weapons are a legitimate means to deter and counter a conventional threat, a retreat from the view that nuclear weapons should be used only to deter other nuclear weapons. The Trump administration also now appears to share this view.

In contrast, China and India have both adopted no-first-use doctrines, and China maintains a nuclear retaliatory capability based on a relatively small force and a second-strike posture.[51] Both China and India have resisted concepts of deterrence that rely on nuclear warfighting capabilities and counterforce targeting. Yet if they move toward multiple-warhead missiles, then this stra-

49. U.S. Department of Defense, *Nuclear Posture Review*, February 2018, https://media.defense.gov/2018/Feb/02/2001872886/-1/-1/1/2018-NUCLEAR-POSTURE-REVIEW-FINAL-REPORT.PDF.

50. Anya Loukianova Fink, "The Evolving Russian Concept of Strategic Deterrence: Risks and Responses," *Arms Control Today* 47 (6) (July/August 2017); Kristin Ven Bruusgaard, "The Myth of Russia's Lowered Nuclear Threshold," War on the Rocks, September 22, 2017, https://warontherocks.com/2017/09/the-myth-of-russias-lowered-nuclear-threshold/.

51. Fiona S. Cunningham and M. Taylor Fravel, "Assuring Assured Retaliation: China's Nuclear Posture and U.S.-China Strategic Stability," *International Security* 40 (2) (Fall 2015): 7–50.

tegic restraint will disappear.[52] Indeed, India already appears to be in a state of doctrinal drift away from its "credible minimum deterrent" posture. In contrast, Pakistan's highly risky posture of "asymmetric escalation" threatens early use of battlefield nuclear weapons if hostilities erupt with India.[53] Both India and Pakistan are examples of "new" nuclear states with doctrines and postures that increase the risk of destabilizing dynamics and arms racing in the region. Their doctrines are "either ambiguous about how to address crucial deterrence related issues" or demonstrate "a clear mismatch between the security challenges faced by [the] state and the kind of role it assigns to nuclear weapons."[54] Because of unresolved tensions over Kashmir between these two nuclear-armed states, the risk of nuclear use is probably increasing in South Asia.

Finally, recent survey experiments suggest that support for the taboo among the American public is weak, and that American public opinion today would not pose a significant constraint should U.S. leaders desire to use nuclear weapons.[55] While these findings are incomplete, along with the shifts in doctrine and discourse they contribute to an overall picture of lowered thresholds for use and fraying normative restraints.

NORMATIVE INCONSISTENCY: THE NUCLEAR POWERS AND THE NONPROLIFERATION NORM

The norm against the spread of nuclear weapons to new states has served as an important element of nuclear restraint since the creation of the NPT in 1968. It is one of the most successful and widely shared nuclear norms. Cooperation of the UN Security Council's P5+1 in the achievement of the Iran nuclear deal bolstered both the norm and the credibility of the NPT.

Nevertheless, the nonproliferation regime itself is deeply troubled by the unresolved asymmetry in the "bargain" between the nuclear and nonnuclear states, and by inconsistent application of the rules. This undercuts the legitimacy of the regime. In the eyes of the nonnuclear states, the implementation of the bargain has disproportionately favored the norms of the nuclear powers. The failure of the P5 to make adequate progress on disarmament and the lack of

52. Michael Krepon, Travis Wheeler, and Shane Mason, eds., *The Lure and Pitfalls of MIRVS: From the First to the Second Nuclear Age* (Washington, D.C.: Stimson Center, May 2016).

53. Timothy Hoyt, "Pakistan's Nuclear Posture: Thinking about the Unthinkable?" in Yoshihara and Holmes, eds., *Strategy in the Second Nuclear Age*, 181–200.

54. Mahesh Shankar and T. V. Paul, "Nuclear Doctrines and Stable Strategic Relationships: The Case of South Asia," *International Affairs* 92 (2) (January 2016): 1.

55. Scott D. Sagan, Benjamin A. Valentino, and Daryl G. Press, "Atomic Aversion: Experimental Evidence on Taboos, Traditions, and the Non-Use of Nuclear Weapons," *American Political Science Review* 107 (1) (February 2013): 188–206; Scott D. Sagan and Benjamin A. Valentino, "Revisiting Hiroshima in Iran: What Americans Really Think about Using Nuclear Weapons and Killing Noncombatants," *International Security* 42 (1) (Summer 2017): 41–79.

an equivalent "monitoring" mechanism for disarmament as compared to the nonproliferation pillar are particularly grating. Perceptions of special treatment of "friends" of the West outside the regime, as in the 2008 U.S.-India civil nuclear deal and the Nuclear Suppliers Group exception for India, as well as U.S. diplomatic protection of Israel's nuclear arsenal, create the impression that the nonproliferation rules do not apply to all. This has led to a deep sense of unfairness on the part of the nonnuclear states. It has encouraged them to pursue alternative approaches to disarmament and undercut their willingness to do more to strengthen the NPT.

Further, three of the nine nuclear powers are free riders on the NPT. Non-members India and Pakistan are expanding their nuclear arsenals while benefitting from the norms that make it more costly for others to enter the bomb-making business. India has actively sought to weaken the nonproliferation commitments it was required to undertake to receive the Nuclear Suppliers Group exemption in 2008.[56] Pakistan complains about unequal treatment with India and continues to block UN negotiations on a fissile materials cutoff treaty. Neither has signed the Comprehensive Nuclear-Test-Ban Treaty (CTBT), taken as a key symbol of a "responsible" nuclear power. As a recent report notes, "neither India nor Pakistan seems willing to take actions that would align its [nonproliferation and disarmament] policies, commitments, and practices with other states currently in the mainstream."[57] Another free rider, Israel, brazenly harangues the rest of the international community to hold Iran to its obligations under the NPT while refusing important nonproliferation obligations itself, such as ratifying the CTBT.

The NPT has become a regime of double standards, unsustainable over the long run. The basic problem is that what was supposed to be a transformation regime—the transformation to a disarmed world—has become a status quo regime. Nonnuclear states perceive that the NPT has become a regime for managing the nuclear status quo in the interests of the nuclear powers, both those inside and, increasingly, those outside the treaty. Other nonproliferation norms face uncertain futures. The emerging norm of nuclear security is off to a respectable start but currently has no institutionalized future, while the buttressing of the norm of civil nuclear cooperation by the U.S.-India deal had the bitter side effect of undermining the core nonproliferation norm.[58]

The Deeply Contested Disarmament Norm

Under the NPT, the nuclear powers have an obligation to pursue disarmament in good faith. The call in *The Wall Street Journal* in 2007 for a nuclear-free

56. Daryl G. Kimball, "Obama's India Nuclear Blind Spot," *Arms Control Today* 46 (6) (June 2016).

57. Toby Dalton, Togzhan Kassenova, and Lauryn Williams, "Introduction," in *Perspectives on the Evolving Nuclear Order*.

58. Ramesh Thakur, *The Global Governance Architecture of Nuclear Security*, Policy Analysis Brief (Muscatine, Iowa: Stanley Foundation, March 2013).

world by four U.S. elder statesmen, along with President Obama's speech in Prague in June 2009, put disarmament squarely back on the agenda of the international community.[59] The enthusiasm for disarmament on the part of civil society and nonnuclear states is largely not shared, however, by those who would have to do the disarming.

The disarmament norm is characterized by a vast disconnect between rhetoric and reality. The ritual incantation of disarmament at the UN seems increasingly disconnected from what nuclear-armed states are doing domestically. Since Prague, although there have been some reductions in numbers, U.S.-Russian efforts at disarmament have stagnated. Russia, China, France, India, and Pakistan are not really interested in disarmament, though they go through the motions. Even France and Britain committed to maintain their nuclear forces in perpetuity.[60] Further, the United States is leading a global expansion of nuclear weapon programs, with plans to spend an unaffordable $1 trillion on the development of a whole new generation of bombs and delivery systems in the name of safety and reliability. Such an enormous level of spending will effectively "establish (or strengthen) strong vested interests against abolition or even meaningful reduction."[61] Russia is also modernizing old systems, both strategic and nonstrategic, and building some new ones. China has started to deploy multiple independently targetable reentry vehicles (MIRVs), and India and Pakistan will likely do the same. The combined stockpiles of nuclear weapons in Pakistan, China, and India could grow by around 250 warheads over the next ten years if current trends continue.[62]

Pretending that this buildup is somehow "disarmament," as the Obama administration did, increased the cynicism of the nonnuclear states, leading them to take matters into their own hands.

The No-Explosive-Testing Norm

The twenty-one-year-old Comprehensive Test Ban Treaty (CTBT) has helped to foster a powerful global norm against nuclear explosive testing. The force of the norm is broader than the law, since today even states that are not parties to the treaty, such as North Korea, are widely condemned for testing. While it enjoys wide support, the CTBT remains unratified by key states, however, including the United States, China, Israel, Egypt, and Iran, and so it is not

59. George P. Shultz, William J. Perry, Henry A. Kissinger, and Sam Nunn, "A World Free of Nuclear Weapons," *The Wall Street Journal,* January 4, 2007.

60. Patrick Wintour, "Britain and France Sign Landmark 50-Year Defence Deal," *The Guardian*, November 2, 2010.

61. William Burr and Jeffrey Kimball, "Seven Decades after Hiroshima, Is There Still a Nuclear Taboo?" *Bulletin of the Atomic Scientists* (August 4, 2015), https://thebulletin.org/seven-decades-after-hiroshima-there-still-nuclear-taboo8591.

62. Krepon, Wheeler, and Mason, *Pitfalls of MIRVs*, 8.

formally in force.[63] The ban thus takes the form of a voluntary moratorium on explosive testing. The declared nuclear powers have maintained a de facto ban on testing since 1996, and India and Pakistan have since 1998. The norm against explosive testing has been broken by only one state in this century—North Korea—which carried out six announced tests in 2006, 2009, 2013, 2016, and 2017.

The CTBT continues to be regarded as an important component of the global nonproliferation and disarmament regime. NPT parties agreed at the 2000 NPT Review Conference that achievement of the CTBT constitutes the first practical step toward disarmament.[64] Today, however, the CTBT exhibits some disconnect between its symbolic, political importance and its practical effect as a restraint. Because of advances in virtual methods of stockpile management, various kinds of "surrogate" testing that rely heavily on computers and do not involve any nuclear detonation have rendered some of the physical impediments imposed by the test-ban treaty less relevant. Ironically, while these technological advances support compliance with the no-explosive-testing norm, they also help nuclear-armed states quietly evade the disarmament norm (mentioned in the CTBT's preamble). Surrogate testing capabilities make it possible for nuclear-armed states to maintain nuclear arsenals indefinitely, even without explosive testing, thus undercutting one of the original purposes of the CTBT.[65] In practice, the CTBT has not had any discernible disarmament effect on nuclear-armed states, or on "existing" nuclear weapons, though it has been observed by some of those states for more than twenty years.

Nevertheless, the ban does make it harder for would-be proliferators to produce a working and deliverable nuclear warhead and for existing nuclear states to develop new designs or miniaturize weapons. For these reasons, it remains an important component of the nonproliferation regime.[66] The puzzle is why the United States, which possesses a sophisticated surrogate testing capability, has failed to ratify a treaty that so clearly preserves its asymmetric advantage, thereby failing to bolster a norm that mostly constrains others but not itself.

As long as the CTBT languishes "out of force," the no-explosive-testing norm remains vulnerable. Some observers worry that Russia may withdraw from the CTBT and begin testing a new generation of warheads in under-

63. Eight states still need to ratify the CTBT for it to come into effect, including the United States, China, Israel, Egypt, and Iran. India, Pakistan, and North Korea have not signed it. The United States has abided by the treaty but the Senate has never ratified it. It is expected that once the United States ratifies it, several other holdouts will quickly follow suit.

64. Lisa Tabassi, "The Nuclear Test Ban: *Lex Lata* or *de Lege Ferenda*?" *Journal of Conflict and Security Law* 14 (2) (Summer 2009): 335–336.

65. Elvira Rosert, Una Becker-Jakob, Giorgio Franceschini, and Annette Schaper, "Arms Control Norms and Technology," in *Norm Dynamics in Multilateral Arms Control: Interests, Conflicts, and Justice*, ed. Harald Müller and Carmen Wunderlich (Athens: University of Georgia Press, 2013), 127.

66. Daryl G. Kimball, "The Enduring Nonproliferation Value of the Comprehensive Nuclear-Test-Ban Treaty," *Nonproliferation Review* 23 (3–4) (2016): 397–408.

ground detonations. With all the nuclear powers engaged in modernization, China, India, and Pakistan may also feel pressures to test, and there are certainly constituencies among the weaponeers in all the nuclear-armed countries who would press for testing. Bringing the CTBT into force would help codify the no-explosive-testing norm and establish a legal barrier to explosive testing along with the verification regime to monitor compliance.[67] The persistent efforts by governments, international organizations, and civil society to bring the CTBT into force reflect the urgency and priority they give to the matter. Still, the major challenge for the test ban today is North Korea's flagrant explosive testing and whether the U.S. president can deliver Senate ratification of the treaty.

The Decline of Arms Control

Even as the nuclear order is fraying, arms control as a tool for managing nuclear rivalries has become discredited. As noted earlier, arms control once played a central role in codifying shared understandings about deterrence. Post-1962 history shows that neither U.S. nor Soviet leaders felt comfortable relying purely on the operation of the balance of terror alone. Rather, they sought to codify shared understandings about the nature of nuclear security in arms control agreements, institutions, and practices as a way to stabilize their relationship. Without this institutional and normative context, deterrence might still have operated, but it would not have been stable.

Today treaties no longer enter into force, or, if they do, they lack key parties. Obama was constrained by hawks in Congress and the Pentagon. Trump has little interest in arms control and even seems determined to end the multilateral 2015 Iran agreement, despite its success so far in restricting Iran's nuclear program and near universal support for it by other states. Russia and the United States have no arms control agenda and no negotiations under way on a new deal to reduce their vast nuclear stockpiles.[68] China has rejected efforts by the United States and Russia to enter into formal arms control discussions, even though it participates in such discussions informally. India and Pakistan have not adequately cooperated on reducing nuclear risks and have failed to develop any meaningful treaty relations to deal with their escalating nuclear and missile standoff.[69] There is currently little prospect for negotiating a ban or serious constraints on MIRVed missiles in Asia. There are no meaningful conversations on nuclear risk reduction between China and India or between India and Pakistan.[70]

67. Tabassi, "Nuclear Test Ban," 337.

68. Kingston Reif and Kelsey Davenport, "Trump's Threat to Nuclear Order," War on the Rocks (blog), October 12, 2017, https://warontherocks.com/2017/10/trumps-threat-to-nuclear-order/.

69. Dalton, Kassenova, and Williams, *Perspectives on the Evolving Nuclear Order*.

70. Krepon, Wheeler, and Mason, *Pitfalls of MIRVs*.

The discrediting of this tool has a number of explanations—the hostility of the George W. Bush administration toward international law in general, the new "cold war" between Russia and NATO, the perception on the part of new nuclear states that a multilateral arms control process would be about preserving the dominant power position of the original nuclear states, unequal nuclear-conventional balances, and the desire of countries to preserve freedom of action in uncertain times.[71] The deeper crisis of arms control is that it suggests a more fundamental rejection among states of cooperation and shared rules of behavior. As Britain's stunning vote in June 2016 to leave the European Union suggests, there is a collective amnesia about how difficult it is to create institutions of peace and cooperation—and how recklessly easy it is to undo them. The disdain for arms control may also reflect a somewhat cavalier attitude toward nuclear weapons and deterrence—perhaps some nuclear "forgetting."

Yet arms control is not simply a technical but an inherently political activity. As Nancy Gallagher reminds us, its "most important potential contribution to global security [is] to progressively increase order and a sense of society among sovereign states while decreasing the role that threats and use of force play in maintaining mutual security."[72]

The Nuclear Prohibition Treaty: Implications for the Nuclear Normative Order

With the nuclear powers failing to lead on disarmament, the nonnuclear states stepped into the gap with a new Treaty on the Prohibition of Nuclear Weapons, adopted at the United Nations on July 7, 2017, by 122 nonnuclear states. The treaty outlaws all aspects of nuclear weapons including their use and threat of use, testing, development, possession, sharing, and stationing in a different country. It is the first multilateral treaty for nuclear disarmament since the 1996 CTBT, and the first legally binding international agreement comprehensively to prohibit nuclear weapons. It will enter into force after fifty states have ratified it.[73]

Unfortunately, as with other multilateral arms control measures these days, it will lack key parties. The nuclear-armed states and U.S. NATO allies boycotted the negotiations, and the nuclear powers made clear that they are not bound by the resulting treaty. This raises the question of what effect the treaty will have.

For advocates, this was an explicitly normative strategy of disarmament.[74] The goal was simply to declare nuclear weapons illegal, just as chemical and

71. Robert Legvold, *Return to Cold War* (Cambridge: Polity, 2016).

72. Gallagher, "Rethinking the Unthinkable," 471.

73. As of this writing (March 2018), fifty-seven states have signed and six states have ratified it.

74. Nina Tannenwald, "Normative Strategies for Disarmament," in *Global Nuclear Disarmament: Strategic, Political, and Regional Perspectives,* ed. Nik Hynek and Michal Smetana (London: Routledge, 2015), 107–121.

biological weapons are, and thereby to establish a new international norm.[75] This would outlaw any use of nuclear weapons. The participation of the nuclear powers was not needed for this. The treaty codifies the moral critique of nuclear weapons into a legal ban. It explicitly seeks "to codify under international law the 'nuclear taboo' or moral imperative not to use nuclear weapons" and to eliminate the legal asymmetry of the NPT.[76] The hope is that the treaty will foster a domestic political debate about nuclear weapons, especially in the democratic nuclear weapon states and those states under a nuclear "umbrella."

Although skeptics argue that the treaty is irrelevant, in fact it poses a serious political and normative challenge to the nuclear-armed states. As a delegitimization process, the humanitarian campaign is an effective strategy because it creates a tension—especially for the three democracies: the United States, Britain, and France—between the values they assign to nuclear weapons and their self-identity as upholders of international law and humanitarian values.[77] The treaty will likely intensify the conflict among the norms of nuclear restraint. The treaty seeks to strengthen the norms of non-use and non-possession, but its most pointed effect is to outlaw deterrence. Like many legal regimes, it will likely have spillover effects even for non-parties. U.S. officials argue—correctly—that the treaty could eventually delegitimize nuclear extended deterrence on which alliance relationships depend. A legal ban will likely complicate policy options for U.S. allies under the U.S. nuclear umbrella who are accountable to their parliaments and civil society. U.S. officials also argue, less plausibly, that the treaty will compete with, and damage, the NPT.[78] This is primarily an argument about competing organizations, not conflicting norms. There is no inherent reason why the prohibition treaty should damage the NPT. Whether it competes with the NPT or supports it, as, for example, nuclear weapon–free zones do, will depend primarily on how states respond. A strategy of seeking to discredit the prohibition treaty could do more harm than good to NPT politics.

Nevertheless, as opposition to the prohibition treaty shows, although widespread support exists for further stigmatizing nuclear weapons, the general opprobrium is far from universal or complete. The nuclear powers themselves continue to believe firmly in the benefits of retaining their nuclear capabilities.

75. Nick Ritchie, "Pathways to Nuclear Disarmament: Delegitimising Nuclear Violence" (working paper, UN General Assembly Open-Ended Working Group, May 11, 2016), 7.

76. Alberto Perez Vadillo, *Beyond the Ban: The Humanitarian Initiative of Nuclear Disarmament and Advocacy of No-First-Use Nuclear Doctrines* (London: British American Security Information Council, May 2016), 3.

77. Nick Ritchie, "Waiting for Kant: Valuing and Delegitimizing Nuclear Weapons," *International Affairs* 90 (3) (2014): 601–623.

78. "Briefing on Nuclear Ban Treaty by National Security Council Senior Director Christopher Ford," Carnegie Endowment for International Peace, August 22, 2017, http://carnegieendowment.org/2017/08/22/briefing-on-nuclear-ban-treaty-by-nsc-senior-director-christopher-ford-event-5675; Rebecca Davis Gibbons, "The Nuclear Ban Treaty: How Did We Get Here, What Does It Mean for the United States?" War on the Rocks (blog), July 14, 2017, https://warontherocks.com/2017/07/the-nuclear-ban-treaty-how-did-we-get-here-what-does-it-mean-for-the-united-states/.

Wider alliance systems such as NATO continue to tout the great value of deterrence and first use as the basis for security, a position that has been revalorized today by Russia's intervention in Ukraine. The commitment to non-use among some of the "new" nuclear powers, such as Pakistan, may be tenuous.

Further, the non-use and disarmament norms face powerful norms that run in the opposite direction: those that associate nuclear weapons with prestige and great power status.[79] Thanks to Putin, Trump, and Kim Jong-un, nuclear weapons are once again being celebrated as symbols of national power. For the older nuclear powers, nuclear weapons have become a matter of both national identity and habit. According to Britain's former Prime Minister Tony Blair, the utility of nuclear weapons is "non-existent in terms of military use." Nevertheless, Blair wrote in his memoir, giving up Britain's arsenal would be "too big a downgrading of our [Britain's] status as a nation."[80] Russia increasingly relies on its nuclear arsenal for signaling and prestige. India has long sought the status associated with nuclear technological prowess, while Pakistan's desire for the bomb has less to do with great power status and more to do with "issues of self-definition" and identity—that is, "being like India, while not India."[81] For disarmament to succeed, supporters will have to dismantle a powerful sense of "nuclear exceptionalism"—leaders' views of their nations "as somehow exceptional and thereby entitled to nuclear weapons."[82]

Renewing a Regime of Nuclear Restraint

Lawrence Freedman has worried that the disarmament norm is "being used to deride other valuable forms of restraint, including deterrence."[83] This is true. Yet it is debatable whether the humanitarian campaign or the nuclear powers themselves are doing more to undermine deterrence. The nuclear-armed states exhibit a striking collective lack of imagination about how to respond to the demands of the humanitarian campaign and the prohibition treaty, even while themselves implementing nuclear doctrines that undermine deterrence, stability, and non-use.

Beyond this, a deeper source of normative unraveling is the unequal distribution of the "benefits" of deterrence. As a result of the asymmetrical nature of the nonproliferation regime, some states possess nuclear weapons, others—such as NATO members—are protected by the nuclear deterrence threats of others, while the rest, who exist outside any nuclear umbrella, must put their faith in

79. Anne Harrington de Santana, "Nuclear Weapons as the Currency of Power: Deconstructing the Fetishism of Force," *Nonproliferation Review* 16 (3) (November 2009): 327.

80. Tony Blair, *A Journey: My Political Life* (New York: Vintage, 2011).

81. Hoyt, "Pakistan's Nuclear Posture," 182.

82. Kjølv Egeland, "Change the Incentives: Stigmatize Nuclear Weapons," *Bulletin of the Atomic Scientists* (March 15, 2016), https://thebulletin.org/change-incentives-stigmatize-nuclear-weapons9261#wt.

83. Freedman, "Disarmament and Other Nuclear Norms," 102.

norms, laws, and morality to protect against nuclear use. As Angela Kane, UN high representative for disarmament affairs, noted in 2015, this situation is inherently unstable. "The risk of proliferation grows every additional day that states insist the doctrine of nuclear deterrence is essential for their security."[84] The larger problem is one of inequitable access to security globally.[85]

Restraint is a condition of keeping a situation "under control or within limits."[86] It is associated with notions of self-control, self-discipline, moderation, and prudence. Without a conscious and collective effort to renew the norms of nuclear restraint, they are likely to unravel further, heightening the risk of nuclear war. A renewed regime of nuclear restraint must be based on the fundamental recognition that security in the nuclear age cannot be achieved unilaterally. Rather, it requires the cooperation of others. A renewed regime of restraint would aim to reduce contradictions and inconsistences in the nuclear normative order through greater effort to balance conflicting norms, which means some attention to principles of equity and fairness.

A No-First-Use Regime

The cornerstone of a renewed regime of nuclear restraint would be strengthening the norm of non-use of nuclear weapons through the adoption of a declared no-first-use policy by all the nuclear powers. There have been increasing numbers of proposals for the United States to adopt a no-first-use policy in recent years, with compelling analyses. However, the case can be made more strongly for common declared no-first-use policies as the linchpin of a renewed regime of nuclear restraint among the nuclear powers.

A no-first-use policy means that nuclear powers would rely on nuclear weapons only to deter nuclear attacks.[87] Adoption of no-first-use would not

84. Angela Kane, "The Home Stretch: Looking for Common Ground Ahead of the 2015 NPT Review Conference," Annecy, France, March 13, 2015.

85. John D. Steinbruner, *Principles of Global Security* (Washington, D.C.: Brookings Institution Press, 2000).

86. Oxford English Dictionary, https://en.oxforddictionaries.com/definition/restrain.

87. An alternative wording is "sole purpose," as in "the sole purpose of the possession of nuclear weapons is to deter the use of such weapons against one's own state and that of one's allies." Sole purpose declarations have been advocated most prominently by the Evans-Kawaguchi International Commission on Nonproliferation and Disarmament in 2009. There may be slight distinctions in meaning: sole purpose refers to intent, while no-first-use refers to behavior. Sole purpose may be slightly less restrictive in that it could leave open the scenario of a counterforce first strike to limit damage in the face of an imminent nuclear attack. In practice, these concepts are largely interchangeable. Former Secretary of Defense William Perry has stated that sole purpose is a more acceptable euphemism for no-first-use in the United States because no-first-use was tarnished during the Cold War by the Soviet Union's disingenuous advocacy of the policy. See Masa Takubo, "The Role of Nuclear Weapons: Japan, the U.S., and 'Sole Purpose,'" *Arms Control Today* 39 (9) (November 2009). The Evans-Kawaguchi report also states that a sole-purpose declaration is essentially a no-first-use commitment disguised under a different formulation, and for the same reasons. See Gareth Evans and Yoriko Kawaguchi, *Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers* (Canberra, Australia: International Commission on Nuclear Non-Proliferation and Disarmament, 2009), paragraph 17.28.

simply be "mere words," but rather both doctrinal and operational issues would follow from it.[88] An operational no-first-use doctrine would eliminate first-strike postures, preemptive capabilities, and other types of destabilizing warfighting strategies. It would induce restraint in targeting, launch-on-warning, alert levels of deployed systems, procurement, and modernization plans. In other words, it would help shape the physical qualities of nuclear forces in a way that renders them unsuitable for missions other than deterrence of nuclear attacks.[89] A no-first-use policy also would reduce the risk of accidental, unauthorized, mistaken, or preemptive use. The removal of threats of a nuclear first strike would strengthen strategic and crisis stability.[90] It would also make absolute the boundary between nuclear and conventional weapons. Finally, by reducing the overall risk of nuclear dangers, no-first-use policies would move toward addressing humanitarian concerns and reducing the salience of nuclear weapons.[91]

As others have argued, no-first-use could be adopted unilaterally or as part of an international agreement. It would move Russia and Pakistan away from their high-risk doctrines and reduce a source of Russia-NATO tensions. For Russia to consider no-first-use, its concerns about U.S. ballistic missile defenses, imbalances in conventional forces, and issues of NATO enlargement would need to be addressed. The United States would need to address the issue of extended deterrence with its allies and move toward conventional extended deterrence.[92] India and Pakistan would need a modus vivendi on Kashmir. The United States and North Korea would need a nonaggression pact.

What are the prospects for this? Skeptics will object that the geopolitical preconditions are not ripe for a no-first-use policy at this time. Russia and North Korea are hostile. The Obama administration choked at the last minute on declaring a no-first-use policy, largely because of pushback from allies who are under the U.S. nuclear umbrella. And restraint is not a word normally associated with President Trump, who trades in excess. But the threat to defend allies such as South Korea and Japan with nuclear weapons these days is hardly credible. In Europe, Russia is busy cutting military spending as its oil revenues shrink, with plans to cut the defense budget by 30 percent.[93] This is not the sign of a country poised to invade the Baltics. Trump could act on his desire for better relations with Russian President Vladimir Putin to begin rolling back both countries' nuclear posturing in Europe. Adoption of a no-first-use policy will require close consultation with allies, but the U.S. administration should begin this task.

88. Scott D. Sagan, "The Case for No First Use," *Survival* 15 (3) (June–July 2009).

89. Vadillo, *Beyond the Ban*, 11.

90. Bruce Blair, "How Obama Could Revolutionize Nuclear Weapons Strategy Before He Goes," *Politico Magazine*, June 22, 2016.

91. Vadillo, *Beyond the Ban*, 12.

92. Sagan, "No First Use."

93. Tony Bertuca, "Russia Poised to Cut Defense Spending 30 Percent," *Inside Defense,* July 7, 2017, https://insidedefense.com/insider/russia-poised-cut-defense-spending-30-percent.

The United States could unilaterally adopt a no-first-use policy, asking other nuclear-armed states to do the same. This would constitute formal adoption of what is already essentially de facto U.S. policy.[94] As even card-carrying realists such as the "four horsemen" recognized, given overwhelming U.S. conventional capabilities on the battlefield, there exists no plausible scenario in which nuclear first use would be in the interest of the United States. A U.S. no-first-use policy would create political space for Russia to follow suit. A common no-first-use policy would also help anchor the existing no-first-use policies of China and India and implicitly acknowledge their leadership in this area, a virtue when middle-power states are feeling disenfranchised from the global nuclear order.

As an initial step on the way to no-first-use and a regime of nuclear restraint, the U.S. administration should consider the recent proposal by Jeffrey Lewis and Scott Sagan that the United States should declare it will not use nuclear weapons "against any target that could be reliably destroyed by conventional means."[95] This policy would not solve the larger problem of the unhappy entangling of conventional and nuclear deterrence (for example, U.S. hypersonic weapons targeted against China). Nevertheless, it would represent an initial important declaratory statement of nuclear restraint.

Beyond no-first-use, the nuclear-armed states must pursue several steps to create a renewed regime of nuclear restraint:

First, they should publically recommit to deterrence and the taboo. Leaders should make speeches that lay out the risks of any use of nuclear weapons and the perils of nuclear brinkmanship and threats. They should reaffirm the importance of the seventy-two-year tradition of non-use and that use of even a small nuclear weapon would open a Pandora's box of unpredictable and potentially dire consequences.[96] The historic visits by Secretary of State John Kerry and President Obama to Hiroshima in spring 2016 were important steps in this direction.

Second, they must develop new understandings of strategic stability. Traditional norms and concepts such as deterrence and strategic stability are still valuable, but how they apply is changing. The nuclear states need to reinvigorate discussions about strategic stability and lessons learned from the historical record of nuclear deterrence.

Third, they must delegitimize nuclear weapons while conceiving new and credible methods for deterring hostile actors. While the humanitarian campaign has sought to undermine support for nuclear weapons, states still see them as effective instruments of deterrence. The nuclear states committed themselves to delegitimizing nuclear weapons in the 2010 NPT Review Conference Action Plan, but on balance they have taken few steps to implement this

94. Blair, "How Obama Could Revolutionize Nuclear Weapons Strategy."

95. Jeffrey G. Lewis and Scott D. Sagan, "The Common-Sense Fix that American Nuclear Policy Needs," *The Washington Post*, August 24, 2016.

96. Steven Pifer, "Time to Push Back on Russia's Nuclear Threats," *The National Interest,* May 10, 2016, http://nationalinterest.org/feature/time-push-back-russias-nuclear-threats-16138.

in practice.[97] Policy creativity is badly needed here if states are to move beyond nuclear weapons without sacrificing deterrence. Nuclear states should refrain from undermining the Nuclear Prohibition Treaty. Policy discussions should include states from inside and outside the nuclear club.

Fourth, they must engage in frank conversations about the morality of deterrence. Deterrence—as a threat to kill millions of innocent people—has always been ethically problematic, what George Quester once called a "necessary moral hypocrisy."[98] Beyond moving toward making deterrence less necessary, civil society and governments should foster debate about whether there are forms of deterrence that would be more morally acceptable. This should include consideration of how the laws of war restrain, or should restrain, nuclear strategy today, including how to respond to the development of more "ethical" nuclear weapons that are also more usable.

Finally, the nuclear-armed powers must delink nuclear weapons from nationalism. Disarmament and further devaluing nuclear weapons will require separating nuclear weapons from conceptions of identity, especially beliefs about great power status and notions of nuclear exceptionalism. This will be a long-term process that will require mobilizing public support for nuclear restraint and a nonnuclear identity. The rise of aggressive nationalism in recent years has been troubling. If that rise is tied to nuclear weapons, it may lead to catastrophe.

97. "Conclusions and Recommendations for Follow-on Actions," *2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons Final Document*, Vol. I, Pt. 1 (New York: United Nations, 2010), http://www.un.org/en/conf/npt/2010/.

98. George H. Quester, "The Necessary Moral Hypocrisy of the Slide into Mutual Assured Destruction," in *Nuclear Deterrence and Moral Restraint*, ed. Henry Shue (Cambridge: Cambridge University Press, 1989), 227–269.

Technology, Doctrine, and the Risk of Nuclear War

James M. Acton

> Arms and military organizations can hardly be considered the exclusively determining factors in international conflict, but neither can they be considered neutral.
>
> —Thomas C. Schelling (1966)[1]

A war between two nuclear-armed states has become all too imaginable. Following Russia's annexation of Crimea in 2014 and its interference in the 2016 U.S. presidential election, Russia's relations with the United States are now probably worse than U.S.-Soviet relations during at least some phases of the Cold War. Stresses between China and the United States, including from the former's land reclamation efforts in the South China Sea, are not as serious and have not built up as quickly, but a sustained détente is unlikely anytime soon. In the six years since Kim Jong-un assumed the leadership of North Korea, Pyongyang's provocative behavior has sunk U.S.–North Korean relations to a level not seen in decades. Indeed, the two states are now engaged in a serious, if slow moving, crisis over North Korea's nuclear and missile programs. Meanwhile, even if the Indian-Pakistani relationship is not especially bad at the moment—if judged by its own low standards—it could deteriorate rapidly and at any time.

The possibility of nuclear use would hang over a deep crisis or conflict in any of these dyads. Fortunately, the day-to-day likelihood of nuclear use is probably still lower than it was during the Cold War. Certainly, the *risk* of nuclear use—the product of consequence and probability—almost certainly remains much smaller. Nonetheless, this risk is increasing, and not only as a result of politics. I will argue in this paper that changes in military doctrine and technology—especially in the context of growing multipolarity—also drive this risk, including in ways that are frequently overlooked.

To be sure, politics, almost certainly, would be the primary factor in pushing two nuclear-armed states to the brink of a war—or over it. Doctrine and technology might exacerbate tensions and make a war more likely, but they would be unlikely to spark one by themselves. Once a conflict was underway,

1. Thomas C. Schelling, *Arms and Influence* (New Haven, Conn.: Yale University Press, 1966), 234.

however, doctrine and technology could be pivotal in driving escalation. Understanding their implications is also important for practical policy-making. After all, however difficult it is to persuade states to change their military doctrine or to focus on less-escalatory technologies, it is much easier than attempting to shape international politics as a whole.

I advance two arguments here about the implications of changes in technology and doctrine for the likelihood of nuclear use. First, these changes are making the nuclear order more difficult to manage. Programs to build up nuclear arsenals, develop new nuclear capabilities, or modernize existing weapon systems can increase tensions between nuclear-armed states. Such tensions can be further magnified by multipolarity, as the steps that one state takes to counter a rival can spark concern in a third country. These dynamics do not increase the chance of nuclear use directly; rather they do so indirectly by increasing both the chance of a conflict and the difficulty of implementing risk-mitigation measures.

Second, in the event that a crisis or conflict occurs, developments in military doctrine for both nuclear *and* conventional warfighting are increasing the likelihood of escalation, whether deliberate or inadvertent, to nuclear use. Technological changes are having a similar effect. Some drivers of this growing danger—such as the development of potentially vulnerable nuclear forces in China, Russia, and Pakistan—are well known from the Cold War. Others are less familiar but include the development, by the United States in particular, of nonnuclear technologies that can threaten—or are perceived as being able to threaten—an opponent's nuclear forces and their enabling capabilities.

MANAGING THE NUCLEAR ORDER

Over the course of the Cold War, eight states developed nuclear weapons, yet strategic relations—like international politics more generally—remained decidedly bipolar in character. China represented the most significant third pole, although political conditions allowed it to brandish its nuclear weapons only rarely. France and the United Kingdom were military allies of the United States. Although both states explicitly retained the option of using nuclear weapons independently of the United States (and Paris even went so far as to withdraw from NATO's unified military command structure), neither came remotely close to needing to do so. Meanwhile, the arsenals of India, Israel, and South Africa remained highly recessed. India tested what it termed a peaceful nuclear explosive in 1974, but moved very slowly thereafter to develop nuclear weapons, and neither deployed nor advertised them. Israel and South Africa also developed nuclear weapons but did not acknowledge their existence (and, indeed, by 1991 South Africa had dismantled its arsenal).

Today, nuclear multipolarity is asserting itself more, albeit rather gradually. This change results primarily not from the very small net increase in the number of nuclear-armed states (South Africa has left the nuclear club, while Pakistan

and North Korea have joined), but from increasingly competitive dynamics within the web of interlocking deterrence dyads.

The most important of these dynamics are occurring among five nuclear-armed states, which are arranged into triangles: one involves the United States, Russia, and China, and a second involves China, India, and Pakistan.[2] Within each triangle, each state seeks to deter both of the others, except for Pakistan and China, which enjoy cooperative relations. Israel is not part of a deterrence dyad with another nuclear-armed state because, today at least, its nuclear weapons serve exclusively as a hedge against a loss of conventional superiority or further proliferation in the Middle East. France, the United Kingdom, and North Korea do have deterrence relations with other nuclear-armed states. However, their nuclear forces are unlikely to have much influence on the evolution of the world's other arsenals over the next few decades (even while the risks of nuclear escalation in a crisis involving North Korea are serious).

Various generic effects, within and between these dyads, are currently embrittling the nuclear order, rendering it more difficult to manage and more prone to crises. Each of these five states has embarked on ambitious strategic procurement programs to develop new nuclear weapons, modernize existing ones, and/or expand their arsenals. Within each deterrence dyad, these programs tend to enhance tensions. Perception is critically important here. Many of these strategic procurement programs, in fact, may be defensively oriented. In particular, those focused on enhancing the survivability of nuclear forces might well mitigate escalation pressures in a crisis or conflict and, on balance, reduce nuclear risks. Yet such efforts often result in increased tensions, because rivals have a definite tendency to interpret them in the worst possible light.

To complicate matters further, because of the multipolar structure of deterrence relations, the dyads are not entirely isolated from one another, creating the possibility of multiplayer competitions. One particular risk is that strategic procurement programs aimed at countering one adversary can inadvertently spark concern—and potentially a counterreaction—in another. This form of the security dilemma involving three states has been termed a "trilemma."[3] These dynamics can be further stoked by cooperation that assists (or is perceived as assisting) a state to enhance its military capabilities. Moreover, multipolarity can increase the challenge of arms control since a state can worry that a bilateral arrangement would disadvantage it relative to an unconstrained third party.

Before showing how these dynamics play out in practice, two underlying assumptions should be made explicit (even if limitations of space preclude making a detailed argument for either). Both assumptions are controversial—

2. James M. Acton, "Bombs Away? Being Realistic about Deep Nuclear Reductions," *The Washington Quarterly* 35 (2) (Spring 2012): 38–41.

3. Linton Brooks and Mira Rapp-Hooper, "Extended Deterrence, Assurance, and Reassurance in the Pacific during the Second Nuclear Age," in *Strategic Asia 2013–14: Asia in the Second Nuclear Age*, ed. Ashley J. Tellis, Abraham M. Denmark, and Travis Tanner (Seattle: National Bureau of Asian Research, 2013), 292–293.

although, in fairness, *no* statements about what makes for safe and stable relations between nuclear-armed states would engender any less dispute.

First, arms buildups, modernization programs, and development programs, especially where they occur competitively, tend to exacerbate international tensions. While there is certainly some truth to the claim that international tensions catalyze arms racing, there is also empirical evidence that arms races exacerbate those tensions.[4] Indeed, throughout the nuclear age, policy-makers—in Washington, Moscow, Beijing, New Delhi, Islamabad, and elsewhere—have regularly cited an adversary's strategic procurement programs as cause for concern. Even if some of those accusations were convenient excuses, the nuclear age would likely have been less fraught if states had shown greater restraint in development and acquisition (and more fraught if they had shown even less). To be sure, strategic procurement is sometimes necessary and can enhance security, but even where it does, it can aggravate interstate tensions nonetheless.

Second, arms control—originally defined, broadly and helpfully, as "all the forms of military cooperation between potential enemies"—can play a significant role in mitigating both the tensions induced by strategic procurement programs and the likelihood of escalation in a crisis.[5] In this regard, the main value of arms control is not in reducing numbers of nuclear weapons *per se*, but in limits and transparency that together create predictability and help to reduce arms race pressures. Even more importantly perhaps, arms control can enhance a state's confidence in the survivability of its nuclear forces and hence mitigate escalatory pressures in a crisis or conflict.

The Two Triangles

The Asian triangle—involving Pakistan, India, and China—is characterized by both nuclear competition and nuclear cooperation. The most obvious rivalry is between India and Pakistan, which are frequently described as being locked in an arms race. Yet this description is potentially misleading; while Pakistan may be racing India, New Delhi is taking part in an altogether different competition with Beijing.

Nuclear technology irritates the Pakistani-Indian bilateral relationship. Worried about India's conventional strength, Pakistan is rapidly augmenting its capacity to produce fissile material and appears to be building up its nuclear arsenal faster than any other state, creating friction with New Delhi. Yet, so far at least, India has not responded in kind. In fact, it has recently shut down one of

4. Susan G. Sample, "Military Buildups, War, and Realpolitik: A Multivariate Model," *Journal of Conflict Resolution* 42 (2) (April 1998): 156–175. For a review of the debate about arms racing see Charles L. Glaser, "The Causes and Consequences of Arms Races," *Annual Review of Political Science* 3 (2000): 251–276.

5. This definition of arms control is from Thomas C. Schelling and Morton H. Halperin, *Strategy and Arms Control* (New York: Twentieth Century Fund, 1961), 2, which also provides an exceptionally cogent argument in its favor. For a counterargument see Colin S. Gray, *House of Cards: Why Arms Control Must Fail* (Ithaca, N.Y.: Cornell University Press, 1992).

its two aging plutonium-production reactors (although this closure was a political sop to the United States and not an act of strategic restraint).[6] But, India does have the *potential* to build up its arsenal quickly, even without building new fissile material production facilities—an unintended side effect, in part at least, of nuclear cooperation with the United States. India's weapon program could, for example, co-opt a fairly large quantity of reactor-grade plutonium that was conspicuously excluded from international safeguards when New Delhi separated its civilian and military nuclear programs pursuant to a 2005 agreement with the United States (this agreement was designed to facilitate international nuclear commerce with India). The 2005 agreement also could enable an Indian buildup by allowing limited domestic uranium resources to be used for weapon production as opposed to power generation. As such, the U.S.-India deal has exacerbated tensions with Pakistan and almost certainly become another driver of Islamabad's expanding nuclear arsenal.[7]

The missile "race" between India and Pakistan is also more complex than it first appears. While both states have very active missile development programs, they have different emphases. Pakistan's primary focus is on short-range systems to offset India's conventional strength. India, however, is primarily pursuing long-range systems to target China. Nonetheless, these missiles still contribute to the rivalry with Pakistan and are thus the manifestation of a trilemma.

Historically, India has probably been a minor consideration for China in crafting its nuclear strategy. Indeed, even in private, Chinese officials have generally denied that Indian nuclear weapons are a consideration for them. Now, however, Beijing appears to be paying more attention. In 2012, for example, a serving Chinese officer, Major General Yao Yunzhu of the People's Liberation Army Academy of Military Sciences, took the unusual, perhaps unprecedented step of acknowledging that "China and India have been securely locked in a relation of mutual deterrence."[8] Retired Admiral Yang Yi has stated that the "indisputable fact" of India's expanding and modernizing its nuclear arsenal demands measures to "enhance strategic mutual trust"—with the implication that New Delhi's efforts are viewed as a potential threat in Beijing.[9] Now China appears to be responding in kind. The U.S. Department of Defense, for exam-

6. Indeed, India has plans to replace the reactor. On the decision to close it, see Dinshaw Mistry, *The U.S.-India Nuclear Agreement: Diplomacy and Domestic Politics* (Cambridge: Cambridge University Press, 2014), 69–70.

7. Conceptually it provides an example of how cooperation, as well as competition, can stimulate arms accumulations within a multipolar system. China's provision to Pakistan, in 1982, of both highly enriched uranium and a nuclear weapon design is another more direct example. See also Zia Mian and M. V. Ramana, "Asian War Machines," *Critical Asian Studies* 46 (2) (2014): 345–360.

8. Interestingly, Yao's context is concern about Indian ballistic missile defense developments. See Yao Yunzhu, "Linking Strategic Stability and Ballistic Missile Defense: The View From China," in *The China-India Nuclear Crossroads*, ed. Lora Saalman (Washington, D.C.: Carnegie-Tsinghua Center for Global Policy, 2012), 74.

9. Yang Yi, "Bridging Historical Nuclear Gaps: The View From China," in Saalman, ed., *The China-India Nuclear Crossroads*, 24.

ple, assesses that India's nuclear arsenal is a "driver," albeit not a primary one, of China's own nuclear modernization programs.[10]

China sits at the intersection of the two triangles. Within the U.S.-Russian-Chinese triangle each state seeks to deter the other two, even if the Sino-Russian deterrence relationship is largely "recessed" (and likely to remain so for some time given growing cooperation between Beijing and Moscow on a range of issues).[11] The United States is, beyond doubt, the main driver of nuclear planning in both Russia and China. A significant point of friction is both states' concerns about the survivability of their nuclear forces, particularly in light of developments in U.S. *non*-nuclear weaponry, including long-range, high-precision conventional weapons and ballistic missile defenses. Both attribute their strategic modernization programs to this concern. In some significant part, these dynamics represent another trilemma, since U.S. ballistic missile defense programs to protect the homeland are oriented at North Korea and a possible future nuclear-armed Iran, not Russia or China.[12]

China is augmenting its nuclear force qualitatively (most significantly by enhancing mobility) and probably also quantitatively—although any growth in numbers is slow.[13] These efforts spark concern in the United States and among some of its allies that Beijing's intentions are not purely defensive. For its part, China has repeatedly stated it "will never enter into a nuclear arms race with any other country."[14] Chinese analysts generally explain this statement as a pledge not to seek numerical parity with the United States and Russia. However, given the opacity surrounding China's nuclear forces—which Chinese officials and experts argue is necessary to ensure their survivability—Beijing's declaratory policy does not appear to have had much impact on reducing Washington's (or probably Moscow's) threat perceptions.

Between Russia and the United States, the New Strategic Arms Reduction Treaty (New START) ensures a high degree of mutual transparency and helps to mitigate mutual concerns about each other's strategic modernization programs. Tactical nuclear weapons are, however, not covered by New START. The United States periodically publishes figures on its total nuclear weapon hold-

10. Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015*, April 7, 2015, 31, http://www.defense.gov/Portals/1/Documents/pubs/2015_China_Military_Power_Report.pdf.

11. Alexei Arbatov and Vladimir Dvorkin, *The Great Strategic Triangle*, The Carnegie Papers (Washington, D.C.: Carnegie Endowment for International Peace, April 2013), 12–14, http://carnegieendowment.org/files/strategic_triangle.pdf.

12. The United States has stated explicitly, however, that regional missile defenses are aimed at China. U.S. Department of Defense, *Ballistic Missile Defense Review Report*, February 2010, 34–35, http://archive.defense.gov/bmdr/docs/BMDR%20as%20of%2026JAN10%200630_for%20web.pdf.

13. Compare, for example, Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2015," *Bulletin of the Atomic Scientists* 71 (4) (2015): 77–84, to previous editions.

14. For example, The State Council Information Office of the People's Republic of China, *China's Military Strategy*, May 26, 2015, sec. IV, http://news.xinhuanet.com/english/china/2015-05/26/c_134271001_4.htm.

ings, which imply continuing reductions of its tactical forces. By contrast, both the size and future trajectory of Russia's tactical forces are highly uncertain. This opacity sparks significant concern among the United States and its European allies. Moreover, the United States has accused Russia of violating the Intermediate-Range Nuclear Forces (INF) Treaty by deploying a prohibited ground-launched cruise missile—adding further stress to the bilateral relationship.[15]

A Multipolar Nuclear Future

As much as this picture of multipolar nuclear interactions already gives cause for concern, its most worrying feature is the potential for much more competitive and corrosive dynamics to emerge quickly. To begin, the future of the U.S.-Russian arms control process is far from assured. There are currently no negotiations toward a successor agreement—a result partly of the decline in bilateral relations but also of numerous Russian preconditions (such as the removal of all tactical nuclear weapons from Europe before the commencement of any negotiations over this type of weapon). It is at least possible that, faced with the expiry of New START in 2021, Moscow will become more pliable. But, even if it does, it may not find a willing and able negotiating partner in Washington—not least because even Democratic senators would be unlikely to support ratification of a new arms control agreement while the United States assesses that Russia is in noncompliance with the INF Treaty.[16] The United States and Russia could buy more time by availing themselves of the option to extend New START once by up to five years. However, it is currently far from clear whether they will do so, and whether they could make productive use of a delay to avert the collapse of the arms control regime.

Multipolarity compounds these challenges. The United States has indicated an interest in further bilateral arms control—or, at least, it did under the administration of President Obama, and the Trump administration has not completely eschewed the possibility. By contrast, Russia's official position is that the *next* round must include *all* nuclear-armed states.[17] While this extreme position might be moderated in any future negotiations, the general trend is clear: as Russia and the United States build down, and as China builds up, both Moscow and Washington are likely to seek some form of involvement from Beijing in arms control (which, initially at least, may simply be greater transparency as opposed to binding limits).

15. Idrees Ali, "U.S. General Says Russia Deploys Cruise Missile, Threatens NATO," Reuters, March 8, 2017, http://www.reuters.com/article/us-usa-russia-missiles/u-s-general-says-russia-deploys-cruise-missile-threatens-nato-idUSKBN16F23V.

16. In fact, this compliance dispute could even lead to the demise of New START before its expiry.

17. For a recent example see "Moscow Slams Washington over Development of 'Prompt Global Strike' System," Sputnik, February 6, 2016, http://sputniknews.com/military/20160206/1034340105/prompt-global-strike.html.

U.S. and Russian calculations are, in part, strategic. But within the United States, domestic politics also has an impact. After New START was signed in April 2010, China's lack of involvement in the treaty became, for the first time, a real issue in an American domestic debate over the ratification of an arms control agreement. And, unless U.S.-Chinese relations take an unexpected turn for the better, the salience of China in any such debates in the future is likely to be greater still. Given China's stated concerns about the survivability of its own nuclear forces, however, and its possible concerns about the future trajectory of India's nuclear forces (not to mention potential bureaucratic barriers), the prospects for its involvement in any form of arms control are currently very poor. As a result, even if the United States and Russia were somehow to overcome the bilateral barriers to future arms control, its continuation would be far from assured. Such a breakdown, however it occurred, would reduce predictability in the U.S.-Russian strategic relationship and perhaps even pave the way for a new arms race.

There are other potential triggers of arms races. India, for example, may decide to accelerate its production of nuclear weapons. Such a decision could be motivated by strategy or domestic pressure (or both), and could be aimed at Pakistan or China (or both). But, whatever the cause, if India started to build up more quickly, China might do so too. If New Delhi's buildup was actually a response to Islamabad, but Beijing wrongly believed it was the target, then these dynamics would constitute a trilemma. Similarly, if China started to increase its arsenal rapidly, the United States or Russia might respond in kind. If Beijing's actions had actually been a response to New Delhi, this situation would represent another trilemma.

Finally, even without further proliferation, new deterrence dyads could emerge, most obviously between Israel and Pakistan. Today, there is little evidence of a deterrence relationship between these two states, not least because both appear to lack delivery systems capable of reaching the other—a result, perhaps, of mutual restraint.[18] Pakistan is, however, openly developing a medium-range ballistic missile, the Shaheen III, which it claims will have a range of 2,750 kilometers—enough to reach Israel from western Pakistan. Israel, meanwhile, is reported to be developing the intermediate-range Jericho III with a range of 4,000 kilometers. If deployed, or perhaps even if not, these missiles could facilitate the emergence of a new deterrence dyad.

An Israel-Pakistan deterrence dyad might be the consequence of another trilemma—two in fact, since it is entirely possible that neither state is seeking to target the other with nuclear weapons. Israel may be focused solely on targeting all of Iran, and Pakistan's only goal may be to reach all of India, but the capabilities they are developing to meet these requirements risk implicating one another. Nonetheless, regardless of each state's true intentions, deterrence

18. At their closest points, Israel and Pakistan are about 2,400 kilometers apart. However, key targets in eastern Pakistan are about 3,500 kilometers from Israel. In theory, aircraft could manage this distance with mid-air refueling. Israeli F-15I aircraft may also have just enough range to reach Pakistan on a one-way mission.

relations would have obvious potential to be particularly fraught. Indeed, this dyad would be the first to involve one country that did not recognize the other's right to exist.[19] Pakistan's then defense minister, Khawaja Muhammad Asif, provided a brief and worrying glimpse into what this deterrence relationship might look like in December 2016. He responded to a fake news story, which claimed that Israel had made a nuclear threat against Pakistan, by posting a now-deleted tweet that read, "Israeli def min threatens nuclear retaliation. . . . Israel forgets Pakistan is a Nuclear state too."[20] In theory, a mutual reassurance process between Israel and Pakistan, focused perhaps on building confidence in precise missile ranges and deployment locations, could be technically possible. Politically, however, it would be extremely difficult to orchestrate, particularly for Pakistan.

The advent of Israeli-Pakistani deterrence relations would be unique among the consequences of nuclear multipolarity discussed here in that it would bear directly on crisis dynamics—at least insofar as it could create a new deterrence dyad in which a crisis could occur. Moreover, its emergence could further fuel multipolar arms race dynamics. For example, if Israel were to start augmenting its long-range forces significantly, Pakistan might respond in kind and, in so doing, stir new concerns in India.

CRISES AND ESCALATION

Rising tensions increase the chance of a deep crisis or even a conventional conflict between two nuclear-armed states. In such a conflict, there would necessarily be some risk that one of these states, in a last-ditch effort to stave off a catastrophic conventional defeat, would resort to the use of its nuclear weapons. Today, this risk of deliberate escalation is growing as a result, in particular, of apparent doctrinal developments in Russia, Pakistan, and North Korea.

Simultaneously, developments in both doctrine and technology are creating a growing danger of inadvertent escalation—escalation that is an unintended consequence of authorized military threats and operations. While there are numerous potential causes of inadvertent escalation, two are particularly important and the focus of the following discussion.

First, crisis instability could occur if, in a deep crisis or conventional conflict, a state became worried that its nuclear forces were at risk of being destroyed preemptively.[21] As an empirical matter, states make generally pessimistic assumptions in assessing the survivability of their own nuclear arsenals (and optimistic

19. While the United States recognized the Republic of China (Taiwan), and not the People's Republic of China, until 1979, it did not question the latter's right to exist.

20. Russell Goldman, "Reading Fake News, Pakistani Minister Directs Nuclear Threat at Israel," *The New York Times,* December 24, 2016, https://www.nytimes.com/2016/12/24/world/asia/pakistan-israel-khawaja-asif-fake-news-nuclear.html.

21. The seminal discussion is Thomas C. Schelling, "The Reciprocal Fear of Surprise Attack," in *The Strategy of Conflict* (Cambridge, Mass.: Harvard University Press, 1960), chap. 9.

ones in assessing their adversaries' arsenals).[22] In a conflict, this pessimism could become intense.[23] In this case, the state could attempt to enhance survivability by modifying its posture—by predelegating launch authority, for example—or it could attempt to ward off an attack by issuing nuclear threats—either of which could trigger further escalation.[24] In extremis, it might even employ nuclear weapons first, most likely in limited ways.

A second pathway to inadvertent escalation would be the transmission of unintended escalatory signals. Giving political leaders the *option* of signaling their willingness to use nuclear weapons is, on balance, desirable, since it could facilitate a form of crisis communication. However, escalatory signals sent without the knowledge of—or perhaps even contrary to the wishes of—political leaders could be very dangerous, since it would lessen those leaders' ability to manage a crisis effectively.

Doctrine and Escalation

Three out of the four deterrence dyads in which a large-scale military conflict is foreseeable in the near future—India-Pakistan, the United States–Russia, and the United States–North Korea—are characterized by serious and lasting asymmetries in conventional power. In each dyad, the weaker state is believed to have potential incentives to initiate conventional violence *and* to contemplate the use of nuclear weapons to offset its weakness—a potentially combustible combination not seen during the Cold War. The stronger power in each dyad, meanwhile, has been developing a military doctrine that seeks to bring its conventional advantage to bear most effectively, but in ways that exacerbate escalation risks. In the fourth dyad, between the United States and China, the conventional balance is more fluid—though the United States still enjoys an advantage even in the West Pacific, let alone further afield. Escalation risks result, nonetheless, from U.S. efforts to maintain its advantage and from Chinese efforts to narrow the gap.

The development of anti-access/area denial (A2/AD) capabilities—by China in particular, but also by Russia and Iran—appears to be driving significant changes in U.S. doctrine for fighting a conventional war. These capabilities seek to prohibit or slow U.S. forces from entering a conflict zone or from maneuvering within it. China's anti-ship ballistic missile, the DF-21D, may be the most headline-grabbing A2/AD weapon, but it is just one part of a larger suite of capabilities. To try and ensure its freedom of maneuver, the

22. For example, see Pavel Podvig, "The Window of Vulnerability that Wasn't: Soviet Military Buildup in the 1970s—A Research Note," *International Security* 33 (1) (Summer 2008): 118–138.

23. Caitlin Talmadge, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Conventional War with the United States," *International Security* 41 (4) (Spring 2017): 50–92.

24. Michael S. Gerson, "No First Use: The Next Step for U.S. Nuclear Policy," *International Security* 35 (2) (Fall 2010): 35–39.

U.S. military has been exploring a concept originally called Air-Sea Battle that has now been subsumed within the somewhat less ear-catching Joint Concept for Access and Maneuver in the Global Commons. According to the Pentagon, the three goals of this concept are to "disrupt adversary command, control, communications, computers, intelligence, surveillance, and reconnaissance . . . destroy adversary A2/AD platforms and weapons systems, and defeat adversary employed weapons and formations."[25]

With the caveat that Air-Sea Battle and its successor are both classified and under development—making any discussion necessarily speculative—these goals appear to present certain risks of crisis instability. The most serious of these risks would arise if, as some U.S. analysts suspect, the command-and-control systems for China's conventional and nuclear missiles overlap.[26] In this case, U.S. strikes designed to deny Beijing control of its conventional ballistic missiles could be mistaken for a first strike on China's nuclear forces.[27] However, even if China has two entirely separate command-and-control systems, it is still possible the United States might misidentify the assets associated with the conventional one and accidentally attack its nuclear counterpart.

Other aspects of Air-Sea Battle are also potentially escalatory.[28] Strikes against China's air defense system or its strategic early-warning system could generate fears that its nuclear forces had suddenly become vulnerable to follow-on attacks. Alternatively, the United States might attack a nuclear-armed DF-21A after misidentifying it as a superficially similar nonnuclear DF-21D. Escalation would be especially likely if Beijing assessed this strike to be the start of a broader campaign against its nuclear forces—which is possible given that some Chinese strategists argue the United States might try to pick off China's nuclear forces one by one, dismissing each strike as an "accident."[29]

Although much less noticed, China's strategy for offsetting the United States' conventional strength also could prove dangerous. Chinese strategists have, for example, advocated attacking command-and-control assets, including

25. Air-Sea Battle Office, U.S. Department of Defense, *Air-Sea Battle: Service Collaboration to Address Anti-Access and Area Denial Challenges*, May 2013, 7, http://archive.defense.gov/pubs/ASB-ConceptImplementation-Summary-May-2013.pdf.

26. John W. Lewis and Xue Litai, "Making China's Nuclear War Plan," *Bulletin of the Atomic Scientists* 68 (5) (September/October 2012): 56–62.

27. Thomas J. Christensen, "The Meaning of the Nuclear Evolution: China's Strategic Modernization and U.S.-China Security Relations," *Journal of Strategic Studies* 35 (4) (August 2012): 467–468.

28. Although focused on a U.S.-Soviet confrontation in the Cold War, the basic principles of escalation set out in Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, N.Y.: Cornell University Press, 1991), remain relevant.

29. Fiona S. Cunningham and M. Taylor Fravel, "Assuring Assured Retaliation: China's Nuclear Posture and U.S.-China Strategic Stability," *International Security* 40 (2) (Fall 2015): 22.

early-warning satellites that have both conventional and nuclear functions.[30] Since such satellites provide cuing information to regional ballistic missile defenses, Beijing might attack them to try and ensure the effectiveness of its conventional missiles, especially if it were losing a war. The United States, however, might interpret such attacks as the prelude to nuclear use; after all, early-warning satellites also serve to detect an incoming nuclear strike, and China might want to suppress them if it were about to use nuclear weapons, not least to try and ensure that such weapons could penetrate homeland missile defenses. To try and persuade Beijing to back down, Washington might issue its own nuclear threats, escalating the crisis toward the nuclear threshold.

In Europe, a Russian move against the Baltic states represents the most likely starting point for a major conflict involving Russia and the United States, which no longer seems entirely unthinkable in light of Moscow's annexation of Crimea. Although NATO enjoys a wide margin of conventional superiority in Europe as a whole, it is significantly weaker than Russia around the Baltic (although efforts are now underway to at least start to address this problem). This imbalance creates the risk that Russia could take NATO territory relatively quickly and painlessly and present the alliance with a fait accompli. Russia might hope that the need for NATO to wage a costly and bloody war to reclaim the territory would deter it from trying. Russia might also try to bolster deterrence by threatening the use of nuclear weapons if NATO did launch a counterattack.[31] This strategy—sometimes termed "escalate to de-escalate" in the Western discourse—creates significant risks of deliberate escalation. Moreover, even if Russia did not act on its nuclear threats following a counterattack, there would still be risks of inadvertent escalation—not least as a result of NATO efforts to suppress Moscow's A2/AD capabilities and its nonnuclear forces, some of which are colocated with some of Russia's nuclear forces.[32] These risks would, however, be probably somewhat smaller than in a war against China, because Russia's nuclear arsenal is significantly more survivable.

In Northeast Asia, while a North Korean invasion of South Korea looks highly unlikely, Pyongyang does have a long history of launching "provocations" against its neighbor. To date, Seoul has shown great restraint in responding. In

30. Michael S. Chase, Andrew S. Erickson, and Christopher Yeaw, "Chinese Theater and Strategic Missile Force Modernization and Its Implications for the United States," *Journal of Strategic Studies* 32 (1) (February 2009): 83; and Tong Zhao and Li Bin, "The Underappreciated Risks of Entanglement: A Chinese Perspective," in *Entanglement: Russian and Chinese Perspectives on Non-Nuclear Weapons and Nuclear Risks*, ed. James M. Acton (Washington, D.C.: Carnegie Endowment for International Peace, 2017), 51–53, http://carnegieendowment.org/files/Entanglement_interior_FNL.pdf.

31. While inconsistent with Russia's official declaratory policy, this strategy is consistent with what senior U.S. civilian officials and military officers have stated they believe Russia's nuclear doctrine to be. See, for example, *Statement of Robert Work, Deputy Secretary of Defense, and Admiral James Winnefeld, Vice Chairman of the Joint Chiefs of Staff, Before the House Committee on Armed Services*, 114th Cong., 4 (June 25, 2015), http://docs.house.gov/meetings/AS/AS00/20150625/103669/HHRG-114-AS00-Wstate-WinnefeldJrUSNJ-20150625.pdf.

32. Alexey Arbatov, Vladimir Dvorkin, and Petr Topychkanov, "Entanglement as a New Security Threat: A Russian Perspective," in Acton, ed., *Entanglement*, 25–26.

a future crisis, however, it might hit back more forcefully, perhaps motivated by domestic pressure. For example, following the shelling of South Korea's Yeonpyeong Island in 2010 and public criticism of the government's weak response, then President Lee Myung-bak vowed that "war can be prevented and peace assured only when such provocations are met with a strong response."[33] Retaliation by Seoul, however, would create the possibility of an escalating conflict involving the United States, which is committed to defend South Korea. Faced with a potentially catastrophic defeat, North Korea might resort to the employment of nuclear weapons to try and coerce the United States and South Korea into backing down. Indeed, although Pyongyang has committed not to use nuclear weapons first, it has also stated that this promise only applies if "hostile forces for aggression do not encroach upon its sovereignty."[34]

Inadvertent escalation could also be a serious problem in a U.S.–North Korean conflict. Once again, U.S. attempts to suppress North Korea's nonnuclear missiles would risk generating crisis instability. Separately, as U.S. political scientists Keir Lieber and Daryl Press argue, "the new American way of war" involves attempts "to blind, confuse, and overwhelm the enemy. *Even if the United States decided to leave the adversary's leaders in power* . . . how would Washington credibly convey the assurance that it was not seeking regime change once its adversary was blinded by attacks on its radar and communication systems and command bunkers?"[35] This escalation pathway would probably become more likely to the extent that North Korea expects the United States to pursue regime change. For this reason, South Korea's overt planning to "decapitate" North Korea's leadership could make it more difficult to assure Pyongyang once the shooting had started.[36] To complicate matters further, the United States probably would—and probably should—be unwilling to foreswear regime change in all circumstances; there would, in particular, be obvious benefits to threatening it in the event that North Korea used nuclear weapons. But there would also be at least one significant disadvantage: a conditional promise not to seek regime change might well be less credible than a blanket promise.

33. Quoted in Ethan Kim, "North Korean Soldiers Boast of Yeonpyeong Island Attack," *Los Angeles Times*, December 27, 2010, http://articles.latimes.com/2010/dec/27/world/la-fg-korea-clash-20101227.

34. "Statement by the Government of Democratic People's Republic of Korea," Korean Central News Agency (KCNA), Pyongyang, January 6, 2016.

35. Keir A. Lieber and Daryl G. Press, "The Nukes We Need: Preserving the American Deterrent," *Foreign Affairs* 88 (6) (November/December 2009): 43 (my italics). Indeed, Pyongyang has repeatedly observed in official statements the fates of Saddam Hussein and Muammar Gaddafi, both of whom gave up nuclear weapon programs and subsequently lost conventional wars to the United States.

36. Choe Sang-Hun, "South Korea Plans 'Decapitation Unit' to Try to Scare North's Leaders," *The New York Times*, September 12, 2017, https://www.nytimes.com/2017/09/12/world/asia/north-south-korea-decapitation-.html.

Finally, it is also possible to trace a clear causal pathway between sub-conventional violence and nuclear use in South Asia.[37] The Pakistani government—or at least elements of it—has a long history of sponsoring terrorism against India. Following the December 2001 terrorist attacks on the Indian parliament and the ensuing crisis, the Indian army began to develop a doctrine, popularly known as Cold Start, to respond to further attacks.[38] It calls for rapid mobilization, followed by a shallow incursion into Pakistan in an effort to punish Islamabad and force it to clamp down on terrorism. Pakistan has explicitly threatened to use nuclear weapons in response—a relatively credible threat given that such use could be on Pakistani soil after Indian troops had crossed the border. Paradoxically perhaps, an Indo-Pakistani crisis could be most dangerous if it was sparked by a terrorist atrocity emanating from Pakistan that was *not*, in fact, authorized by Islamabad. In this case, as U.S. analyst George Perkovich notes, India might wrongly blame Pakistan, and each side, believing itself to be the victim of aggression, could be particularly reluctant to back down.[39]

Nuclear Weapons and Escalation

Programs to develop new strategic capabilities or modernize existing ones tend to spark a debate about whether they are "stabilizing" or "destabilizing." It's only a slight exaggeration to say that for "nuclear hawks" the distinction depends only on whether their own country is conducting the program (in which case it's stabilizing) or another country is (when it's not). As judged by "nuclear doves," meanwhile, all such programs are destabilizing. Instead, the implications of nuclear weapon systems need to be considered on a case-by-case basis.

The most worrying developments are occurring in North Korea, which is developing land-based mobile missiles and sea-launched ballistic missiles, with the presumed goal of enhancing the survivability of its nuclear forces. Such efforts may enhance crisis stability; but any reduction in inadvertent escalation risks could be more than offset by an increased likelihood of deliberate escalation. Specifically, Pyongyang is developing intercontinental ballistic missiles (ICBMs), with the explicit goal of holding at risk targets in the United States,

37. For an alternative escalation pathway to the one presented here, based on Indian first use, see Vipin Narang's remarks in "South Asia's Evolving Strategic Doctrines," Stimson Center, Washington, D.C., July 19, 2017, 2–13, https://www.stimson.org/sites/default/files/file-attachments/Strategic%20Doctrines%20-%20Event%20Transcript.pdf.

38. The Indian Army has denied the existence of an official doctrine by the specific name of "Cold Start," but it has endorsed the concept's essential elements and practiced them in exercises. For a recent discussion of Cold Start and its escalation risks see George Perkovich and Toby Dalton, "Proactive Strategy," in *Not War, Not Peace? Motivating Pakistan to Prevent Cross-Border Terrorism* (Oxford: Oxford University Press, 2016), chap. 2.

39. George Perkovich, *The Non-Unitary Model and Deterrence Stability in South Asia* (Washington, D.C.: Stimson and Carnegie Endowment for International Peace, November 13, 2012), 13, http://carnegieendowment.org/files/George_Perkovich_-_The_Non_Unitary_Model_and_Deterrence_Stability_in_South_Asia.pdf.

which guarantees the security of both Japan and South Korea. If North Korea reaches the point (if it hasn't already) where it believes it has attained mutual vulnerability with the United States, then, following the logic of the so-called stability-instability paradox, it may be more inclined to act aggressively against U.S. allies at the conventional and sub-conventional levels.[40]

Two developments in nuclear weaponry elsewhere appear particularly dangerous from the perspective of exacerbating inadvertent escalation risks. Programs to develop tactical nuclear weapons—particularly "battlefield" systems, such as short-range missiles, weapons delivered by short-range aircraft, and nuclear artillery—probably create the most acute risks. Pakistan is openly developing and deploying nuclear-armed, land-based ballistic and cruise missiles, which are reported to have ranges as low as sixty kilometers.[41] Russia is probably also modernizing its force of battlefield weapons as part of an apparently extensive but highly opaque effort to update its large arsenal of tactical nuclear weapons.[42] There has even been some informed speculation that North Korea may also be developing nuclear artillery.[43]

The short ranges of such weapons necessitate their deployment near the battlefield, where they are potentially highly vulnerable to nonnuclear strikes or even to being overrun by a rapid advance. Although destruction of these weapons would not compromise a state's ability to threaten an adversary's homeland with nuclear strikes, it would undermine the state's strategy for war termination on acceptable terms, raising the prospect of a catastrophic conventional defeat. As a result, "use 'em or lose 'em" dynamics could still trigger nuclear escalation. Moreover, to compensate for the inherent vulnerability of battlefield nuclear weapons and also, perhaps, to ensure operational flexibility, states might predelegate launch authority to field commanders, further exacerbating escalation risks.

The second development is Russian and Chinese efforts to field silo-based ICBMs armed with multiple independently targetable reentry vehicles (MIRVs). Russia has openly advertised its development of a new "heavy" missile, that is, a silo-based, liquid-fueled ICBM capable of delivering a large number of warheads. (Exactly how many warheads this weapon will carry is not known, but it is intended to replace the SS-18 Satan, which can be loaded with ten.) Meanwhile, according to the U.S. Department of Defense, China is currently in the

40. The concept of the stability-instability paradox, if not that specific phrase, originates in Glenn Snyder, "The Balance of Power and the Balance of Terror," in *Balance of Power*, ed. Paul Seabury (New York: Chandler, 1965), 184–201.

41. For details see Hans M. Kristensen and Robert S. Norris, "Pakistani Nuclear Forces, 2015," *Bulletin of the Atomic Scientists* 71 (6) (November/December 2015): 59–66.

42. The arsenal also includes air defense weapons and long-range cruise missiles, which cannot be described properly as battlefield weapons.

43. Jeffrey Lewis, "More Rockets in Kim Jong Un's Pockets: North Korea Tests a New Artillery System," *38 North* (blog), U.S.-Korea Institute at Johns Hopkins School of Advanced International Studies, March 7, 2016, http://38north.org/2016/03/jlewis030716/.

process of fielding its first MIRVed missile by converting some old single-warhead, silo-based DF-5 ICBMs into a multiple-warhead variant.[44]

These programs may be financially attractive to Russia and China since putting multiple warheads on one missile is cheaper than building one missile for every warhead. But they are likely to come with the cost of an increase in the already acute fears that these states have for the survivability of their nuclear forces. Because it is generally assumed that two nuclear warheads would be used to destroy one silo, placing multiple warheads on the missile inside turns it into a much more attractive target. Doing so is also likely to compound Moscow's and Beijing's concerns about the vulnerability of their nuclear forces to conventional weapons, since silos are potentially vulnerable to advanced nonnuclear penetrators.[45]

At the other end of the spectrum, various modernization programs—including U.S. efforts to develop a new nuclear-powered ballistic missile submarine (SSBN), and Russian and Chinese efforts to field new land-based, mobile ICBMs—should promote stability by enhancing survivability. Some of the potential benefits may, however, be seriously compromised by states' deployment practices. Mobile weapons are survivable only after being dispersed, and the act of dispersing them, which might be purely defensive, could send unintended escalatory signals. This risk can be mitigated by keeping some weapons permanently dispersed, as a number of nuclear-armed states do with their SSBNs. However, Russia and China do not appear to have adopted this practice with their mobile ICBMs.

An apparent shift in China's nuclear strategy may further exacerbate this risk. Historically, Beijing appears to have planned to "ride out" a nuclear attack before retaliating. However, an important officially sanctioned textbook, the 2013 edition of the *Science of Military Strategy*, states that China has now developed the capability to launch its nuclear weapons on receiving warning of an incoming attack.[46] While publicly available evidence suggests that this claim may be an exaggeration since China's early-warning capabilities may not yet be adequate to enable a launch-on-warning posture, Beijing has embarked on an effort to modernize these capabilities and potentially facilitate a change in

44. Office of the Secretary of Defense, *Annual Report to Congress 2015*, 8.

45. James M. Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike* (Washington, D.C.: Carnegie Endowment for International Peace, September 2013), 82–87, http://carnegieendowment.org/files/cpgs.pdf. Because mobile ICBMs are significantly less vulnerable than silo-based weapons, Moscow's new MIRVed mobile ICBMs are much less of a concern, as would be any such systems fielded by Beijing in the future.

46. Gregory Kulacki, *The Chinese Military Updates China's Nuclear Strategy* (Cambridge, Mass.: Union of Concerned Scientists, March 2015), 4, http://www.ucsusa.org/sites/default/files/attach/2015/03/chinese-nuclear-strategy-full-report.pdf. See also Joshua H. Pollack, "Boost-Glide Weapons and U.S.-China Strategic Stability," *Nonproliferation Review* 22 (2) (2015): 160–161.

posture in the not-too-distant future.[47] At the same time, China still appears to keep its warheads and missiles stored separately, as it has always done, and there is little evidence that it is rethinking this arrangement. As a result, Beijing may be moving toward a posture in which its nuclear forces are kept off alert on a day-to-day basis, but placed on alert during a crisis. If so, the act of alerting would necessitate sending highly escalatory signals regardless of whether Chinese leaders actually wanted to. Moreover, China's missile forces could be particularly vulnerable while warheads were being mated to missiles, exacerbating the risk of crisis instability. In fact, if China is to move away from its traditional policy of riding out an attack, it would probably be better for it to "go all the way" and keep at least some portion of its forces permanently on alert. Compared to a policy of alerting in a crisis, such a posture would slightly increase the risk of an accidental launch but significantly lower the risks of inadvertent escalation.

From a crisis stability perspective, it is not only the survivability of a state's own nuclear forces that matters; the extent to which it can threaten an opponent's forces is also important. From this perspective, U.S. efforts to modernize the B-61 gravity bomb, which appear to involve improving the weapon's accuracy and hence its ability to destroy "hard" targets, could exacerbate escalation risks with Russia and China.[48] In this case, such an outcome was not inevitable—the B-61 could have been modernized without increasing its military capabilities—but in other cases irresolvable trade-offs between different escalation risks can arise. For example, bombers are the most effective type of nuclear weapon delivery system for signaling, and so they are a useful tool for crisis management. The United States is currently developing a new nuclear-capable bomber, the B-21. If nuclear signals sent using this aircraft are to be credible, it must be able to penetrate the advanced air defenses that Russia and China are currently developing. However, given that these defenses probably have a role in protecting Moscow's and Beijing's nuclear forces, the capability to penetrate them is unavoidably escalatory.[49]

Nonnuclear Weapons and Escalation

The escalation risks resulting from developments in nuclear weaponry are at least familiar. Historical experience provides some kind of an empirical basis for understanding these risks, since perceived first-strike threats really did generate crisis instability during the Cold War—such as the dispersal of forces in crises

47. According to media reports, this program involves the development of early-warning satellites. For example, "China Plans to Launch Test Satellite for Missile Defense," Kyodo News, August 24, 2015.

48. Hans M. Kristensen, *The B61 Life-Extension Program: Increasing NATO Nuclear Capability and Precision Low-Yield Strikes*, Information Brief (Washington, D.C.: Federation of American Scientists, June 2011), http://fas.org/programs/ssp/nukes/publications1/IssueBrief_B61-12.pdf.

49. Indeed, given that the B-21 is set to be dual capable, it could be seen as enhancing the U.S. capability for both nuclear and conventional counterforce.

out of fear they were vulnerable—even if such instability did not culminate in nuclear use.[50] Moreover, this experience may lead military planners to have some awareness of the risks. By contrast, the escalation risks resulting from developments in *non*-nuclear weapons are much less familiar. Looking forward, however, the emerging interactions between nuclear and nonnuclear weapons—sometimes termed "entanglement"—may prove to be a defining risk of the current nuclear age.

One manifestation of entanglement is dual-use delivery systems (that is, systems that can carry both nuclear and conventional warheads), as well as nuclear delivery systems that are superficially similar to nonnuclear ones. Such entanglement creates concern that a state might mischaracterize an incoming nonnuclear weapon as nuclear armed and launch a nuclear response. Such "warhead ambiguity" is a major argument against the United States' development of a new nuclear-armed cruise missile.[51] Supporters of the missile counter this concern by noting, entirely correctly, that "the United States has used dual-capable cruise missiles around Russia's periphery multiple times . . . all without starting a nuclear war."[52] Yet, on none of these occasions was the United States at war with Russia itself, so they provide little evidence about how Moscow (or Beijing or Washington) might react—or not react—if it were the target. Indeed, part of the reason why this debate is both static and rancorous is the almost complete absence of evidence for either side, making it extremely difficult to assess the severity of the risk.

Moreover, the focus on warhead ambiguity may be overshadowing a potentially much more serious risk arising *prior* to the employment of dual-use delivery systems. In 2015, for example, China advertised its deployment of a new intermediate-range ballistic missile, the DF-26. According to apparently authoritative sources, the same missile body can be loaded with either a nuclear or conventional warhead (in contrast to other Chinese missiles, which have slightly different nuclear-armed and conventionally armed variants).[53] This capability—termed "change the warhead, not the missile"—increases inadvertent escalation risks for two different reasons. First, if the United States misidentified conventional missiles as nuclear armed, it might wrongly conclude that China was considering nuclear use and potentially take aggressive measures to

50. James M. Acton, "Reclaiming Strategic Stability," in *Strategic Stability: Contending Interpretations*, ed. Elbridge A. Colby and Michael S. Gerson (Carlisle, Pa.: Strategic Studies Institute and U.S. Army War College Press, 2013), 123–128.

51. William J. Perry and Andy Weber, "Mr. President, Kill the New Cruise Missile," *Washington Post*, October 15, 2015, https://www.washingtonpost.com/opinions/mr-president-kill-the-new-cruise-missile/2015/10/15/e3e2807c-6ecd-11e5-9bfe-e59f5e244f92_story.html.

52. Matthew Costlow, "The New Nuclear Cruise Missile and the Stability Argument," RealClearDefense, February 9, 2016, http://www.realcleardefense.com/articles/2016/02/09/the_new_nuclear_cruise_missile_and_the_stability_argument_109003.html.

53. Andrew S. Erickson, "Academy of Military Science Researchers: 'Why We Had to Develop the Dongfeng-26 Ballistic Missile'—Bilingual Text, Analysis and Related Links," December 5, 2015, http://www.andrewerickson.com/2015/12/academy-of-military-science-researchers-why-we-had-to-develop-the-dongfeng-26-ballistic-missile-bilingual-text-analysis-links/.

try and convince China to back down. Second, the United States might find itself attempting to destroy nuclear-armed missiles preemptively if it incorrectly assessed that they were loaded with conventional warheads. In this case, there would be a high risk of China's wrongly interpreting U.S. operations as either an extremely aggressive nuclear signal, or worse still, as the opening salvos of a broader move against its nuclear forces.

By contrast, it seems unlikely that the "classic" warhead ambiguity problem could trigger inadvertent escalation after a DF-26 missile had been launched. The U.S. arsenal is highly survivable, so once DF-26 missiles were actually in flight, Washington would have little to reason to use nuclear weapons until the incoming missiles had detonated, allowing the nature of their payloads to be definitively determined (though, of course, Washington might well take other steps, such as attempting to intercept the missiles while still in flight).

A second manifestation of entanglement is nonnuclear threats—whether actual or perceived—to nuclear weapons and their enabling capabilities. During the Cold War, such risks were subject to serious consideration by Western analysts only during the decade or so before the collapse of the Soviet Union, with a focus on threats to Soviet SSBNs and its command-and-control system.[54] At the time, Soviet analysts were already starting to worry about whether advanced nonnuclear munitions might soon pose a direct threat to all components of their nuclear forces. Twenty-five years later, this possibility is a major concern of Russian nuclear strategists and, perhaps even more so, of their counterparts in China, which has a smaller and less survivable arsenal.[55] These concerns have been most vocally expressed in the context of opposition to U.S. ballistic missile defense deployments. However, they extend to U.S. high-precision conventional weapons, including cruise missiles and even guided gravity bombs, and to improvements in the United States' ability to identify and track mobile targets. In fact, most worrying of all to Moscow and Beijing is the *combination* of precise conventional weapons and ballistic missile defenses on the grounds that, even if U.S. missile defenses could not defeat a large-scale attack, they might be able to "mop up" the smaller number of warheads that might survive a conventional first strike. Some Russian and Chinese strategists even argue that threatening to retaliate with surviving nuclear weapons after a purely conventional U.S. first strike lacks credibility.

These concerns can appear fanciful to U.S. officials and analysts, and sometimes are dismissed as either paranoid or insincere. Indeed, for the foresee-

54. Barry R. Posen, "Air War and Inadvertent Nuclear Escalation," in *Inadvertent Escalation*, chap. 2; John J. Mearsheimer, "A Strategic Misstep: The Maritime Strategy and Deterrence in Europe," *International Security* 11 (2) (Fall 1986), especially 14–17, 40–42, and 45–54.

55. For a flavor of these concerns see Alexei Arbatov, Vladimir Dvorkin, and Sergey Oznobishchev, *Non-Nuclear Factors of Nuclear Disarmament: Ballistic Missile Defense, High-Precision Conventional Weapons, Space Arms* (Moscow: IMEMO RAN, 2010), http://www.nuclearsecurityproject.org/uploads/publications/NON_NUCLEARFACTORSOFNUCLEARDISARMAMENT_062210.pdf; Yao Yunzhu, "China Will Not Change Its Nuclear Policy," *China-U.S. Focus*, April 22, 2013, http://www.chinausfocus.com/peace-security/china-will-not-change-its-no-first-use-policy.

able future, it is inconceivable that U.S. nonnuclear weapons would be able to undermine Russia's or even China's nuclear deterrents. Moreover, it is sometimes useful for Russian and Chinese officials to play up their concerns, such as when arguing for greater military spending at home or scoring diplomatic points abroad. Yet, the evidence suggests that, by and large, Russian and Chinese concerns are real—which matters because, ultimately, the risk of crisis instability depends primarily on perceptions of force survivability.

The U.S. Department of Defense has frequently credited Chinese concerns. For example, in its 2015 annual report on *Military and Security Developments Involving the People's Republic of China,* the Pentagon assesses that Chinese strategic modernization efforts are "intended to ensure the viability of China's strategic deterrent in the face of continued advances in U.S. and, to a lesser extent, Russian strategic [intelligence, surveillance, and reconnaissance], precision strike, and missile defense capabilities."[56] A similar statement appeared in the five previous iterations of this report.

The U.S. Department of Defense does not produce an equivalent report on Russia, so its assessment of Russian concerns is not publicly known. However, the huge cost of Russia's strategic modernization program shows that it is putting its money where its mouth is. Most aspects of this program—including the fielding of new SSBNs and road-mobile ICBMs—are clearly oriented toward enhancing survivability (if Russia's only goal were to maintain numerical parity with the United States, it could do so much more cheaply by building only silo-based ICBMs). Air defenses constitute a second major focus of Russia's military modernization; it is procuring the advanced S-400 system in large numbers and is developing the even more sophisticated S-500 system. Given that both systems will be deployed to protect Russia's nuclear forces, these investments underscore the seriousness of its concerns about its vulnerability to precise conventional weapons.

In fact, Russian and Chinese actions point to other concerns they have yet to voice publicly. The nuclear forces of both countries are preparing defenses against cyberattacks.[57] One interpretation of these efforts is that Moscow and Beijing are seeking to prevent the unauthorized use of their nuclear weapons. While this may be partially true, their primary fear is probably that Washington might employ cyber weapons to try to *deny* them control of their nuclear forces (presumably as one element of a nonnuclear first strike). The possibility of

56. Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015*, 31. The 2016 and 2017 iterations of this report used subtly different language, stating "*China insists* that the new generation of mobile missiles, with warheads consisting of MIRVs and penetration aids, are intended . . ." (my italics). Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2017*, May 15, 2017, 60, https://www.defense.gov/Portals/1/Documents/pubs/2017_China_Military_Power_Report.PDF.

57. Michael Pillsbury, "The Sixteen Fears: China's Strategic Psychology," *Survival* 54 (5) (October-November 2012): 157; "Cyber Security Units to Protect Russia's Nuclear Weapons Stockpiles," RT, October 2014, https://www.rt.com/news/196720-russia-missile-forces-cybersecurity/.

cyberattacks against nuclear weapons, or more likely their command-and-control system, might add to the risk of crisis instability. It might also create a virtual form of warhead ambiguity. One characteristic of cyber weapons is that fully determining the purpose of malware, especially complex malware, is both difficult and time consuming. As a result, a state that discovered a virus in its nuclear command-and-control system might be unable to determine the attacker's intentions and mistake, say, an intelligence-gathering operation for an offensive one, sparking a potentially escalatory reaction.

Looking forward, the degree of entanglement between nuclear and nonnuclear forces appears set to increase as a result of further technological developments. The United States is conducting research and development into various technologies for precise, long-range conventional weapons that could travel at hypersonic speeds (at least five times the speed of sound). The Conventional Prompt Global Strike program, which is focused on the development of rocket-launched gliders, is the most well-known example of such a program, but it is not the only one.[58] Both Moscow and Beijing (which, incidentally, also are exploring these technologies) worry that such weapons might be able to destroy their nuclear forces directly.[59] Technological developments could also threaten the survivability of nuclear forces by holding command-and-control capabilities at risk. Ground-based components, such as antennae and satellite uplinks, are relatively "soft" targets and may already be vulnerable to high-precision conventional weapons. Meanwhile, reliable anti-satellite weapons, especially if able to reach targets in geostationary orbit, could threaten command-and-control satellites. Such entanglement bodes ill for stability.

LOOKING FORWARD

The drivers behind the growing likelihood of nuclear use are a mix of the old and the new. Crisis instability remains a major potential cause of inadvertent escalation, and the underlying dynamics, driven by concerns about force survivability, are the same as during the Cold War. The types of nuclear weapons that most exacerbate these risks—heavy ICBMs and short-range tactical systems—also remain the same. What has changed is the perceived emergence of serious nonnuclear threats—both kinetic and non-kinetic—to nuclear forces. Such threats are one manifestation of the growing entanglement of nonnuclear weapons with nuclear forces and their enabling capabilities. Entanglement is also creating other escalation pathways, without much of a Cold War antecedent, such as the possibility of nonnuclear operations transmitting unintended but highly escalatory signals. Simultaneously, deliberate escalation is becoming more

58. For an overview see Acton, *Silver Bullet?*

59. James M. Acton, "Russia and Strategic Conventional Weapons: Concerns and Responses," *Nonproliferation Review* 22 (2) (June 2015): 141–154; Pollack, "Boost-Glide Weapons and U.S.-China Strategic Stability."

likely, largely as a result of the relatively new risk of conventionally weak powers that rely heavily on nuclear weapons and have potential incentives to start wars.

These risks are likely to become more acute over time. Multipolarity could facilitate the emergence of both damaging new arms races and fraught new deterrence dyads, even if further proliferation is held at bay. Developments in nonnuclear technology are likely to create even more entanglement. And all forms of risk reduction, but especially cooperative approaches, are becoming more difficult.

The challenge with cooperative risk reduction is, in part, technical. Governments have failed to subject most types of tactical nuclear weapons to arms control (though there are, at least, some promising ideas about potential approaches).[60] These challenges pale in comparison, however, to the difficulty of developing risk-mitigation measures for some types of nonnuclear weapons that are becoming increasingly entangled with nuclear forces. Cyber weapons present particularly daunting challenges, but there is also no obvious way forward on anti-satellite weapons or even conventional cruise missiles. That said, the extent of the challenge depends on the specific technology. It could be very straightforward, for example, to make rocket-launched hypersonic gliders accountable under any future strategic arms control treaty.

Yet the greatest difficulties are, as always, political. Growing nuclear multipolarity undermines the feasibility of bilateral arms control, yet there is little appetite to tackle the complexities of multilateral negotiations. Generally poor relations between key states complicate matters further (although, as the Cold War demonstrates, states can take advantages of even temporary thaws to negotiate and implement useful arms control arrangements). Moreover, some states may even oppose the goal of reducing the risk of inadvertent escalation. Russia and China, for example, may be reluctant to disentangle their nuclear and nonnuclear forces, because doing so could reduce the risk to the United States of attacking Moscow's or Beijing's nonnuclear forces. Thus, regardless of why these states entangled their nuclear and nonnuclear forces in the first place (a question that is open to considerable debate), they may now view entanglement as advantageous to deterrence.

The challenge of international politics is heightened by the generally corrosive effects of domestic politics. While it is simply incorrect to look back at the Cold War as a time when American politics stopped at the border, widespread fear about the possibility of a nuclear war did, from the mid-1960s onward, help to surmount some of the political barriers to arms control. Today, nuclear weapons lie near the edge of public consciousness almost everywhere, and, in the United States, arms control is often subject to the furies of a political system that is much more polarized than at any time during the Cold War. Moreover,

60. The only exception was weapons eliminated under the INF Treaty. For suggestions on next steps in tactical nuclear arms control see CSIS Next Generation Working Group, *Beyond New START: Enhancing U.S. National Security through Arms Control with Russia* (Washington, D.C.: Center for Strategic and International Studies, September 2011), 16–18, http://csis.org/files/publication/110824_Acton_BeyondNewSTART_WEB.pdf.

American domestic politics is not the only problem. In South Korea, for example, popular pressure to respond forcefully to future provocations by North Korea could spark an escalating conflict. Meanwhile, it remains to be seen for how long Indian public opinion will tolerate New Delhi's lack of a response to Pakistan's rapid nuclear buildup.

Under these circumstances, the most promising—or, perhaps, the least unpromising—avenue to risk reduction lies with organizational reform within governments and militaries. In making a similar proposal more than two decades ago, U.S. political scientist Barry Posen acknowledged this conclusion may seem "odd," but organizational reform provides one promising and practical pathway to raising the salience of nuclear risks in decision-making processes.[61]

The importance of perceptual factors in driving interstate tensions, arms races, and escalation—especially inadvertent escalation—is difficult to overstate. Even a strategic procurement program motivated exclusively by defensive goals, such as enhancing force survivability, can stir tensions, and sometimes induce a counterreaction, because an adversary may judge it imprudent to assume that its purpose is entirely benign. In a crisis or conflict, the belligerent parties' perceptions of the survivability of their own nuclear forces, as opposed to any more objective measure, would be the key determinant of crisis stability. The likelihood of escalation would also depend heavily on the extent to which leaders were capable of accurately assessing the intentions behind the adversary's operations, and were simultaneously capable of understanding how their own operations might be interpreted—or misinterpreted—by the adversary.

Militaries are organized frequently in ways that tend to lead to such factors being discounted. The responsibilities for conventional and nuclear war planning are often divided, for example, which impedes consideration of the pathways by which conventional conflicts might inadvertently escalate to nuclear use. In the United States, conventional war planning is the province of the regional combatant commands, such as U.S. Pacific Command, while nuclear war planning is generally the responsibility of U.S. Strategic Command. More fundamentally, militaries, which are tasked with winning battles, are often poorly equipped to determine how an adversary might assess a new weapon system or interpret the purpose behind a military operation. Rather, it is civilians, including intelligence analysts, who are best placed to make such calls.

Organizational reform could help ameliorate these problems. In particular, nuclear-armed states could set up dedicated teams of civilian specialists, within defense departments or militaries, responsible for mitigating nuclear risks. These teams could assess war planning for its potential escalation consequences, and examine strategic procurement programs (whether nuclear or nonnuclear) from the same perspective, as well as for their effects on interstate tensions and arms racing. They could also be charged with developing arms control and confidence-building proposals to mitigate any identified risks. The results from their analysis would be made available to the senior decision-makers responsible for

61. Posen, *Inadvertent Escalation*, 218.

overseeing procurement and war planning, who would be tasked with weighing them alongside other, more traditional military considerations. These risk-reduction teams could also be included in the group of advisers responsible for providing advice to national leaders in a crisis or conflict.

This idea is, of course, unlikely to gain traction in all of the nuclear-armed states, especially those in which strategic procurement and war planning is subject to a minimum of civilian oversight. But other nuclear-armed states would lose nothing by setting up such teams, and the United States, in particular, should take the lead. Ideally the Pentagon would set up a new assistant secretary, reporting to the under secretary of defense for policy, to lead risk-reduction efforts (although, in practice, creating a new deputy assistant secretary position would probably be a more realistic goal).

By itself, organizational reform is almost certainly an inadequate response to the scale of the challenge, but it would be a useful first step. At a practical level, while governments and militaries may be difficult to reform, they are at least more susceptible to change than international politics. Moreover, by institutionalizing greater awareness of escalation risks, organizational reform might help pave the way for a more proportionate response.

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Meeting the Challenges of the New Nuclear Age

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