Études de l'Ifri

Proliferation Papers 63

STRATEGIC RISK REDUCTION BETWEEN NUCLEAR-WEAPONS POSSESSORS

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January 2021

Security Studies Center

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ISBN: 979-10-373-0294-6

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How to cite this publication:
Corentin Brustlein, "Strategic Risk Reduction between Nuclear-Weapons Possessors", *Proliferation Papers*, No. 63, Ifri, January 2021.

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The author is indebted to countless experts who provided feedback upon reading previous drafts of this report and listening to oral presentations of its major findings. He is particularly grateful to Nicolas André, Lew Dunn, Céline Jurgensen, Michael Krepon, Brad Roberts and Heather Williams for their fantastic contribution. Responsibility for the contents of the report remains the author's alone.

Editorial board

Abstract

The topic of nuclear risk reduction has gained momentum in the international security debate among policymakers, nongovernmental organizations, and experts. The current and expected demise of the traditional arms-control architecture, the renewed strategic competition, and the polarization of the multilateral debate on nuclear weapons have contributed to this renewed salience. Building upon the 2019 G7 Statement on Non-Proliferation and Disarmament, this report defines strategic risk reduction as the set of unilateral, bilateral, and multilateral measures that aim at lowering the likelihood of nuclear weapons use through improved communication, predictability, and restraint, and underlines the need to adopt a strategic approach to nuclear risk reduction. Risks emanating from conflict dynamics between nuclear powers are different in nature and severity from those arising from technical incidents. This report argues that in a context of growing geopolitical rivalries, diplomats should prioritize mitigating the former type of risk. Risk reduction efforts should aim at hindering the most dangerous behaviors in crisis time, through measures focusing both on nuclear forces and on nonnuclear capabilities, whose impact on strategic balances keeps growing. Strategic risk reduction can strengthen international security and strategic stability by complementing arms control measures and deterrence policies. It is therefore crucial to ensure that diplomatic initiatives aimed at limiting nuclear risks do not ultimately, and paradoxically, increase the risk of war. Historical experience shows not only the feasibility of such an approach, but also the concrete security benefits that can be derived from it, by channeling the behavior of nuclear powers in times of tensions, reducing the ambiguity inherent in certain strategies and behaviors, or laying the foundations for international regimes based on operational and strategic restraint as well as on transparency.

Résumé

Depuis plusieurs années, le thème de la réduction des risques nucléaires prend de l'ampleur dans le débat de sécurité internationale, en réponse au renouveau de la compétition stratégique, à l'affaiblissement des traités de maîtrise des armements et aux tensions persistantes au sein du régime de non-prolifération. Cette étude propose une approche stratégique de la réduction des risques nucléaires, qu'elle définit comme l'ensemble des mesures unilatérales, bilatérales et multilatérales visant à réduire le risque d'emploi d'armes nucléaires grâce à l'amélioration des communications, la prévisibilité et la retenue. Se distinguant des travaux existants, cette approche souligne que les risques émanant de conflits entre puissances nucléaires sont de nature et de portée profondément différentes des incidents techniques. Dans un contexte de rivalités géopolitiques grandissantes, ils devraient donc constituer la priorité des efforts de réduction des risques. Ces derniers entendent entraver les comportements les plus dangereux en temps de crise, par le biais de mesures portant à la fois sur les forces nucléaires et sur les capacités non nucléaires, dont l'influence sur les équilibres stratégiques va croissant. La réduction des risques stratégiques peut renforcer la sécurité internationale et la stabilité stratégique, en agissant en complément des mesures de maîtrise des armements et des postures de dissuasion. Il est donc crucial de veiller à ce que les initiatives diplomatiques visant à limiter les risques nucléaires n'aboutissent pas, par effet pervers, à accroître les risques de guerre. L'expérience historique souligne non seulement la faisabilité d'une telle approche, mais également les bénéfices directs pouvant en être tirés, qu'il s'agisse de canaliser les comportements des puissances nucléaires dans les moments de tension, de réduire l'ambiguïté inhérente à certaines postures et stratégies, ou de poser les bases de régimes internationaux fondés sur la transparence et la retenue opérationnelle et stratégique.

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Introduction

Over the past years, risk reduction has become a topic of rising interest among policymakers, nongovernmental organizations, and experts.[1] While nuclear risk reduction first appeared as an area of policy concern in the 1960s and as a concept in the early 1980s, several factors have recently contributed to its renewed salience. The current and expected demise of the traditional nuclear and conventional arms-control architecture that has mostly focused on constraining capabilities raises the question of alternative measures, whether cooperative or not, to prevent not only a return to qualitative and quantitative arms competition, but the very risk that the nuclear taboo might be broken.[2] It has thus become necessary to think again about the types of measures that might channel the behavior of nuclear-armed states and of regional powers away from provocative and risk-prone moves, particularly in a context of renewed strategic competition. Indeed, such a competitive setting might see both an increased number of crises, and crises in which the stakes are higher, with parties more willing to escalate and manipulate risk. Furthermore, multiple current developments in science and technology (cyber, artificial intelligence, space warfare, hypersonic glide vehicles, social media, etc.) have the potential to change the severity and nature of the risks associated with nuclear weapons by creating

1. The United Nations Institute for Disarmament Research (UNIDIR) has been particularly active on this topic. See J. Borrie, T. Caughley and W. Wan (eds.), *Understanding Nuclear Weapon Risks*, Geneva: United Nations Institute for Disarmament Research, 2017; W. Wan, *Nuclear Risk Reduction: A Framework for Analysis*, Geneva: United Nations Institute for Disarmament Research, 2019; W. Wan (ed.), *Nuclear Risk Reduction: Closing Pathways to Use*, Geneva: United Nations Institute for Disarmament Research, 2020. For other examples, see J. Cartwright (chair), *Global Zero Commission on Nuclear Risk Reduction*: *De-Alerting and Stabilizing the World's Nuclear Force Postures*, Washington, D.C.: Global Zero, 2015; M. Downman and M. Messmer, *Re-emerging Nuclear Risks in Europe: Mistrust, Ambiguity, Escalation and Arms-racing between NATO and Russia*, London: British-American Security Information Council, April 2019; M. Messmer, *Strategic Risk Reduction in the European Context: Risk Assessment and Policy Recommendations*, London: British-American Security Information Council, June 2020; R. Paul, *Advancing Strategic Risk Reduction in Europe*, London: British-American Security Information Council, March 2020; B. Roberts (ed.), *Major Power Rivalry and Nuclear Risk Reduction: Perspectives from Russia, China, and the United States*, Livermore, CA: Lawrence Livermore National Laboratory/Center for Global Security Research, May 2020; S. van der Meer, "Reducing Nuclear Weapons Risks: A Menu of 11 Policy Options", *Policy Brief*, Clingendael Institute, June 2018.

2. L. F. Brooks, "The End of Arms Control?", *Daedalus*, Vol. 149, No. 2, Spring 2020, pp. 84-99; L. Kulesa, "The Crisis of Nuclear Arms Control and Its Impact on European Security", *Non-Proliferation and Disarmament Papers*, No. 66, January 2020.

new vulnerabilities or new sources of pressure on decision-makers during crises.[3]

The state of the nonproliferation regime and the polarization of the multilateral debate on nuclear weapons, particularly within the context of the Non-Proliferation Treaty (NPT), also constitute a key factor leading to renewed interest in risk reduction. Many observers anticipate that, in a context marked by increased strategic tensions and threats to multilateralism, the next NPT Review Conference could see deep divisions between participating states.[4] Risk reduction appears to be one of the areas in which communities with different and sometimes conflicting priorities could bridge the gap between them, and identify pragmatic middle ground where progress appears possible and beneficial.[5]

The literature on nuclear risks generally defines risk as the combination – or the product – of two factors: the probability of an event and the severity of its consequences.[6] Since the dawn of the nuclear era, various potential dangers have been associated with nuclear weapons: accidents involving nuclear weapons, nuclear proliferation, theft of a weapon or of fissile material, arms-racing, and, in the most extreme case, nuclear use – whether it takes the form of a massive nuclear exchange or of a more limited one, authorized or not. Among those risks, in the current context of heightened tensions at the global and regional levels, reducing the probability of nuclear weapons use has stood out as a critical priority around which efforts should converge.[7]

There are, however, diverse paths that could in theory lead to nuclear weapons use. Technical failure, ambiguous warnings of impending attack, opaque declaratory policies, misinterpretation of actions, entangled

3. See for instance M. Libicki, *Crisis and Escalation in Cyberspace*, Santa Monica, CA: RAND Corporation, 2012; B. W. MacDonald, "Deterrence and Crisis Stability in Space and Cyberspace" in: M. Krepon and J. Thompson (eds.), *Anti-satellite Weapons, Deterrence and Sino-American Space Relations*, Washington, D.C.: Stimson Center, 2013, pp. 81-100; H. A. Trinkunas, H. Lin and B. Loehrke (eds.), *Three Tweets to Midnight: Effects of the Global Information Ecosystem on the Risk of Nuclear Conflict*, Stanford, CA: Hoover Institution Press, 2020.
4. UK Parliament, House of Lords, Select Committee on International Relations, *Rising Nuclear Risk, Disarmament and the Nuclear Non-Proliferation Treaty*, 2019.
5. P. Ingram and M. Downman, *Stepping Stones to Disarmament: Making Progress in a Polarised International Climate*, London: British American Security Information Council, April 2019; M. Messmer, *Strategic Risk Reduction in the European Context, op. cit*.
6. T. Caughley and W. Wan, "Understanding Nuclear Weapon Risks" in: J. Borrie, T. Caughley and W. Wan (eds.), *Understanding Nuclear Weapon Risks*, *op. cit*., p. 12; P. Lewis *et al*., *Too Close for Comfort: Cases of Near Nuclear Use and Options for Policy*, London: Chatham House, April 2014, p. 4; N. Ritchie, "Nuclear Risk: The British Case", Article 36 briefing paper, February 2014, p. 1. Risk has been defined in an even broader sense by some authors such as Chavas, who defines a risky event as "any event that is not known for sure ahead of time". J.-P. Chavas, *Risk Analysis in Theory and Practice*, San Diego, CA: Elsevier Academic Press, 2004, p. 6.
7. W. Wan (ed.), *Nuclear Risk Reduction: Closing Pathways to Use*, *op. cit*.

conventional and nuclear lines of operations, lack of operational restraint in the use of force, or even the pursuit of ambitious war aims, to the point of threatening the vital interests of a nuclear-armed rival, could all, under certain circumstances, lead to the use of nuclear weapons. Risk-reduction measures alone cannot address all of these sources of concern, and should thus be considered as one instrument, alongside formal arms control and deterrence policies, through which states can strengthen both national security and global strategic stability.[8]

A fundamental connection exists between risk reduction and arms control. Both rest on the assumption that some degree of cooperation with potential adversaries can not only help, but is required to avoid worst outcomes. Arms control and risk reduction are not, however, synonymous. While arms control was initially conceptualized as a very broad and diverse endeavor comprising formal and informal measures affecting capabilities and behaviors,[9] it became increasingly identified by policymakers as the formal, treaty-based pillar of cooperative security aimed at quantitatively and qualitatively constraining nuclear arsenals and, to a lesser extent, conventional arsenals. This understanding of arms control is still dominant today. Arms-control treaties imposing limits on capabilities only partially address the risk of nuclear use, however, and were supplemented early on by less formal measures aimed at establishing norms of restraint, predictability, and transparency between potential adversaries. These measures have generally been grouped under the different label of confidence-building measures (CBMs), and indeed have represented a central part of the nuclear risk-reduction agenda for the past 50 years. However, and in contrast with both treaty-based arms control and CBMs, which generally are bilateral or multilateral, risk reduction can be advanced through unilateral moves, reciprocal or not, such as transparency efforts, cuts in force structure, and revisions in modernization plans to exercise and demonstrate restraint. Risk reduction can thus be considered at the same time as underpinned by the initial approach and principles behind arms control, complementary to treaty-based formal arms control and broader than CBMs.

8. In this paper, strategic stability is defined as the situation in which the fear of a surprise disarming attack does not incentivize states to use nuclear weapons in a crisis or in a conflict, or to augment their nuclear force qualitatively or quantitatively – a definition that thus includes both crisis stability and arms race stability. J. M. Acton, "Reclaiming Strategic Stability" in: E. A. Colby and M. S. Gerson (eds.), *Strategic Stability: Contending Interpretations*, Carlisle: Strategic Studies Institute and US Army War College Press, 2013, p. 121.

9. T. C. Schelling and M. H. Halperin, *Strategy and Arms Control*, New York, NY: The Twentieth Century Fund, 1961, p. 2.

Most of the literature on nuclear risk reduction logically focuses on measures specifically tailored to nuclear arsenals and policies, whether they have to do with force structure, doctrine and declaratory policy, or command and control. This report argues, however, that risks of nuclear use cannot be properly understood or tackled as long as they are thought of in isolation from the broader security context and from the dynamics that affect non-nuclear capabilities. It is hard to imagine any scenario leading to nuclear use that would not start at the non-nuclear level of conflict, particularly since non-nuclear capabilities such as high-end conventional weapons, space and cyber weapons have taken a growing role in security policies and military planning – and one that will be increasingly central. As conventional balances have always been expected to weigh on the calculus of decision-makers contemplating nuclear use, constraints on non-nuclear capabilities and operations were part of the Cold War nuclear risk-reduction agenda. In the recent past, paradoxically, even though the higher profile of non-nuclear capabilities and their growing centrality in strategic warfare should have made them central to any risk-reduction agenda, the tendency has been to focus exclusively on nuclear capabilities.[10]

Reflecting the view that risks of nuclear use may have non-nuclear origins, the 2019 G7 Statement on Non-Proliferation and Disarmament refers to "risk reduction" and "strategic risk reduction" instead of "nuclear risk reduction".[11] This report follows the same path and focuses on strategic risk reduction, defined *as the set of unilateral, bilateral and multilateral measures that aim at lowering the likelihood of nuclear weapons use, be it accidental, unauthorized, or deliberate, through improved communication, predictability, and restraint*. The following pages lay out what strategic risk reduction, understood as a strategic approach to nuclear risk reduction, might be, and what it has to offer in a context of increased tensions.

10. Recent notable works on the connection between non-nuclear capabilities and nuclear risks include J. M. Acton (ed.), *Entanglement: Russian and Chinese Perspectives on Non-Nuclear Weapons and Nuclear Risks*, Washington, D.C.: Carnegie Endowment for International Peace, 2017; J. M. Acton, "Escalation through Entanglement: How the Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War", *International Security*, Vol. 43, No. 1 (Summer 2018), pp. 56-99; C. Talmadge, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Conventional War with the United States", *International Security*, Vol. 41, No. 4 (Spring 2017), pp. 50-92. For an earlier perspective, see B. R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks*, Ithaca, NY: Cornell University Press, 1991.

11. *2019 G7 Statement on Non-Proliferation and Disarmament*, Biarritz, April 6, 2019, available at: www.elysee.fr. Some nongovernmental organizations such as BASIC have also followed the same path. See M. Messmer, *Strategic Risk Reduction in the European Context*, *op. cit.*; R. Paul, *Advancing Strategic Risk Reduction in Europe*, *op. cit.*

Crafting a risk-reduction agenda requires establishing priorities among various available options. In doing so, a strategic approach to risk reduction discriminates risks emanating from conflict dynamics between nuclear powers from those arising from technical incidents, and, in a context of rising geopolitical rivalries, prioritizes the former over the latter. This approach also stresses the necessity to craft risk-reduction measures that better account for the diverse political motives of parties involved in a crisis or a conflict, and thus for the ambivalence of risk – which is not only the byproduct of the mere existence of nuclear weapons but something that can be generally actively manipulated by each party to a conflict. It emphasizes the importance of measures related to non-nuclear capabilities to reduce risks of nuclear use, as well as the benefits of focusing on behavioral and operational forms of restraint.

This report makes the case that, in a crisis between nuclear-armed countries, there are still outcomes everyone wants to avoid, whether they say it or not. Adopting a strategic approach to risk reduction leads us to revise some assessments of the effectiveness and expected benefits of risk-reduction measures: they have helped to channel competitive strategies away from risky behaviors, and can continue to do so, but cannot by themselves prevent war, and should not be expected to. While they cannot prevent a determined aggressor from attacking a neighbor, risk-reduction measures can make it less appealing, or more visible, and thus easier to anticipate, while making it less likely than any such decision would be based on incorrect information. Risk-reduction strategies can thus mitigate the consequences of uncertainty and ambiguity surrounding each country's actual ambitions, which lead them to assume the worst when looking at the military policy of their potential adversaries – what academics have conceptualized as the "security dilemma".[12]

This report starts by looking back at the history of risk reduction as a complement to treaty-based arms control, and how it was repurposed toward new priorities at the end of the Cold War. The second section describes what a strategic approach to risk reduction might be – an approach that focuses on mitigating the effects of the security dilemma on crisis dynamics and reconnects the risks of nuclear weapon use with the conflict from which they arise. The third section illustrates some of the positive effects that strategic risk reduction has had in competitive environments by examining the track record of some existing risk-reduction measures.

12. J. Herz, "Idealist Internationalism and the Security Dilemma", *World Politics*, Vol. 2, No. 2, January 1950, pp. 157-180; R. Jervis, "Cooperation Under the Security Dilemma", *World Politics*, Vol. 30, No. 2, January 1978, pp. 167-214.

Both the historical experience with CBMs and the characteristics of the current and expected security environment show the promises of such an approach. Risk-reduction measures have proven their value during and after the Cold War, and appear more needed than ever as strategic competition seems to intensify. While the renewed emphasis on the competitive dimension of international politics stresses the limits of cooperative security instruments and the enduring need for policies that can discourage aggression, it remains crucial that the possessors of nuclear weapons rediscover and reaffirm their shared interest in avoiding worst outcomes and in the enduring importance of restraint in national security strategies.

The Rise of Risk Reduction

Risk reduction emerged during the Cold War as a line of effort pursued in parallel with treaty-based arms control. As a second pillar of the arms-control agenda with the aim of lowering the risk of nuclear war through cooperative measures, it sometimes paved the way for the successful conclusion of arms-control treaties. Risk reduction was the approach behind the first bilateral CBMs adopted from the 1960s on, pursued either as area-specific efforts (direct communications, incidents at sea, etc.), or as a built-in element of bilateral arms-control treaties such as the SALT II, START and New START treaties. After the end of the Cold War, reflecting the widespread perceptions that major war was becoming less and less plausible,[13] nuclear risk reduction was slowly but largely dissociated from the arms-control agenda, as attention focused on different priorities such as nuclear security.

The first nuclear age and its consequences

The rise of risk reduction in the first nuclear age was closely related to the emergence of arms control as both a concept and a policy objective. It appeared because the two superpowers were increasingly concerned with the risk of nuclear weapons use happening not as part of a deliberate strategy (surprise disarming nuclear strike, massive retaliation in response to a large-scale conventional attack, etc.) but as the result of a dynamic initiated and fueled by the complex interactions between ambiguous signals, fallible decision-makers, and composite arsenals. In that sense, the rise of risk reduction as a concern reflected the shared willingness by Washington and Moscow to exert and maintain strategic control over their nuclear weapons: both wanted to make sure that, if any nuclear weapon ever had to be released, it would be the result of a deliberate decision taken by legitimate political authorities (positive control), not the result of a technical incident or of an unauthorized act.[14] In this perspective, reducing the risks of nuclear

13. J. Mueller, *Retreat from Doomsday: The Obsolescence of Major War*, New York, NY: Basic Books, 1989.

14. Trade-offs between measures designed to ensure positive control over nuclear arsenals and those meant to maintain negative control have been clearly identified over the past decades. J. D. Steinbruner, "Choices and Trade-offs" in: A. B. Carter, J. D. Steinbruner and C. A. Zraket (eds.), *Managing Nuclear Operations*, Washington, D.C.: The Brookings Institution, 1987, pp. 539-543.

use meant adopting a posture that would at the same time limit the risks of war by accident, of war by miscalculation, and of unrestrained war.[15]

The "Nuclear Revolution" – the argument according to which nuclear weapons have deeply transformed foreign policy and military strategy, making major war and military attempts to change the status quo less probable[16] – rests on the unique destructiveness of nuclear weapons. The revolutionary character of nuclear weapons was identified early on by some strategic thinkers,[17] who also captured the ambiguities and unique risks associated with the nuclear era: the new risks of a disarming first strike and the requirements associated with the "delicate" balance of terror,[18] the coexistence of the nuclear balance and limited conventional or irregular wars,[19] and the role of psychological factors in the management of crises.[20]

The actual policies and doctrines of early nuclear powers, shaped by conflicting political priorities, individual preferences, and specific organizational cultures, unsurprisingly lagged behind the conceptual debate for the first 10 to 15 years. Still, the specificities of the nuclear age grew more influential among American decision-makers, and political priorities slowly evolved to better take into account the limits of nuclear "superiority" and the necessity to manage both conflict and cooperation with the Soviet Union.

Among the factors that led to the salience of arms control was the fact that the dawn of the nuclear era radically changed the feasibility and consequences of surprise attacks. Surprise attacks had been a common feature of military history, and some of those conducted during the Second World War had been so successful that they heavily weighed on the national perceptions and military doctrines that emerged and endured during the Cold War. The Pearl Harbor attack was central in the early American thinking on deterrence,[21] while the trauma left by the Barbarossa plan in the minds of Soviet military theorists only reinforced the importance they gave

15. J. T. McNaughton, "Arms Restraint in Military Decisions", *The Journal of Conflict Resolution*, Vol. 7, No. 3, 1963, pp. 228-234. I am grateful to Lew Dunn for pointing out this reference.
16. R. Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon*, Ithaca, NY: Cornell University Press, 1989.
17. See in particular the works of Bernard Brodie, Hermann Kahn, William Kaufmann and Albert Wohlstetter.
18. A. Wohlstetter, "The Delicate Balance of Terror", *Foreign Affairs*, Vol. 37, No. 2, January 1959, pp. 211-234.
19. Suggested by the stability-instability paradox first coined in G. H. Snyder, "The Balance of Power and the Balance of Terror" in: P. Seabury (ed.), *The Balance of Power*, San Francisco, CA: Chandler, 1965, pp. 198-199.
20. T. C. Schelling, *Arms and Influence*, New Haven, CT: Yale University Press, 1966.
21. R. Wohlstetter, *Pearl Harbor: Warning and Decision*, Stanford, CA: Stanford University Press, 1962.

to the "initial phase of war".[22] What made issues of surprise and warning different in the nuclear era were the consequences of such an attack: while it had been possible to recover from most initial shocks of conventional surprise attacks, it might be impossible to recover from a nuclear one. Even with early-warning systems in place, an incoming attack might be detected too late to ensure the survivability and effectiveness of a sufficient portion of the retaliatory bomber force, thus damaging the credibility of the deterrence posture.[23] The speed of ballistic missiles able to strike in the full geographical depth of an adversary territory, compounded with the sheer destructiveness of nuclear weapons, only strengthened the willingness of decision-makers to put measures in place to prevent surprise attacks.[24]

The enormous potential benefits or costs associated with striking first and the resulting fear of retaliatory attacks were thus identified as shaping crisis dynamics by exerting pressure toward rapid decision-making, reducing the time available to collect evidence of the other party's intentions, and incentivizing escalation based on potential misunderstandings. The nature of the risks associated with such an unstable situation opened the way to proposals of restraint and cooperative measures since, as Thomas Schelling put it, "[t]he surprise-attack problem, when viewed as a problem of reciprocal suspicion and aggravated 'self-defense', suggests that there are not only secrets we prefer not to keep, but military capabilities we prefer not to have".[25] The connection between crisis behavior, strategic instability and "arms control" measures such as direct communications links between the two superpowers was thus clearly identified before both countries had been to the brink of nuclear catastrophe.[26]

As influential as strategic thinkers might have been, ultimately only the actual experience of nuclear-weapons states going through crises changed the dominant perceptions among the political and military circles of both superpowers, thus providing an impetus for negotiations and potential change in postures. While the number of crises in which American and

22. A. A. Kokoshin, *Soviet Strategic Thought, 1917-1991*, Cambridge, MA: The MIT Press/Belfer Center for Science and International Affairs, 1999, pp. 86-89, 122-124; S. J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000*, Washington, D.C.: Smithsonian Institution Press, 2002, p. 79.

23. A. J. Wolhstetter, F. S. Hoffman and H. S. Rowen, *Protecting U.S. Power to Strike Back in the 1950's and 1960's*, Santa Monica, CA: RAND Corporation, 1956, pp. 9-41.

24. M. S. Gerson, "The Origins of Strategic Stability: The United States and the Threat of Surprise Attack" in: E. A. Colby and Michael S. Gerson (eds.), *Strategic Stability: Contending Interpretations*, Carlisle, PA: US Army War College Press, 2013, pp. 1-46.

25. T. C. Schelling, *The Strategy of Conflict*, Cambridge, MA: Harvard University Press, 1960, p. 231.

26. For instance, see T. C. Schelling and M. H. Halperin, *Strategy and Arms Control*, *op. cit.*; M. Halperin, *Arms Control and Inadvertent General War*, Washington, D.C.: Institute for Defense Analyses, Study Memorandum 6, March 10, 1962, pp. 10-25.

Soviet interests were pitted against each other grew, leaders learnt of the unique risks associated with the existence of nuclear weapons and came to recognize the potential value of arms control and of risk-reduction measures.[27]

Learning how to live with the bomb

The first set of mutually agreed nuclear arms-control and risk-reduction measures immediately followed the 1962 Cuban Missile Crisis. Among the priorities was the need to ensure direct lines of communications between the two superpowers that could be used in times of crisis. The US had proposed, in April 1962, a treaty to establish a direct communications link with the Soviet Union, following initial discussions through the Eighteen Nations Committee on Disarmament. Coming closer to the brink of nuclear war helped to lift the initial Soviet reluctance, leading to the signature on June 23, 1963 of the treaty establishing a direct communications link (DCL, also known as the "Hotline") between Washington and Moscow.[28]

Once recognized as both an urgent necessity and a potentially promising area of progress in the early 1960s, risk reduction was pursued in parallel with formal arms-control negotiations focused on capabilities (the SALT and later START processes), while risk-reduction measures (particularly CBMs) aimed at lowering the likelihood of nuclear use, be it accidental, unauthorized, or deliberate, through improved communication, predictability, and restraint.[29] The same rounds of bilateral negotiations occurring during the détente era that led to the signature of the SALT I and ABM treaties rapidly led to the conclusion of four risk-reduction measures, either directly or indirectly linked to nuclear weapons:

- the 1971 Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War;
- the 1971 Agreement on Measures to Improve the US-USSR Direct Communications Link (although the updates were not fully operational until 1978);

27. J. S. Nye, "Nuclear Learning and U.S.-Soviet Security Regimes", *International Organization*, Vol. 41, No. 3, Summer 1987, pp. 371-402.
28. S. K. Horn, "The Hotline" in: J. Borawski (ed.), *Avoiding War in the Nuclear Age: Confidence-Building Measures for Crisis Stability*, Boulder, CO: Westview Press, 1986, p. 63.
29. Joseph Nation distinguishes "structural arms control", focused on qualitative and quantitative constraints on arsenals, from "intentional arms control" that focuses on measures such as operational restraint and information exchange. J. E. Nation, "Introduction" in: J. E. Nation (ed.), *The De-escalation of Nuclear Crises*, Basingstoke: MacMillan, 1992, p. xxii.

- the 1972 Incidents at Sea (INCSEA) Agreement;[30]
- the 1973 Agreement on the Prevention of Nuclear War.

By the end of the 1970s, détente had collapsed, and the Soviet invasion of Afghanistan convinced the US leadership to stop pursuing the ratification of the SALT II agreement. Interestingly, as US foreign policy took a hawkish turn under the first term of President Ronald Reagan, a parallel track continued in support of risk-reduction measures. In his address to the UN General Assembly gathered in June 1982 for a Special Session on Disarmament, Ronald Reagan stated that "steps should be taken to improve mutual communication, confidence, and lessen the likelihood of misinterpretation", and announced that the United States would "approach the Soviet Union with proposals for reciprocal exchanges in such areas as advance notification of major strategic exercises that otherwise might be misinterpreted; advance notification of ICBM launches within, as well as beyond, national boundaries; and an expanded exchange of strategic forces data".[31] These proposals were formally delivered to the Soviet Union in November 1982.

Shortly before that, in the US Congress, an amendment to the Department of Defense Authorization Act for 1983 was introduced by Senator Sam Nunn, with Republican co-sponsorship. The amendment, which then became law, requested the US Administration to think more about nuclear risk reduction, by introducing a requirement for the Pentagon to prepare "a full and complete study and evaluation of possible initiatives for improving the containment and control of the use of nuclear weapons, particularly during crises".[32] The Department of Defense was asked to consider a number of areas of risk reduction worth exploring, and specific measures that could be taken to strengthen crisis stability, whether at a bilateral level (improving the DCL, lengthen the warning time available to both nations, create a bilateral forum to exchange information about nuclear risks associated with third parties, etc.) or at a multinational level (military control center to monitor and reduce the risk of use by third parties and terrorist groups). While the study concluded in April 1983 advised against trying to establish a multinational military communications link, it identified several CBMs that could contribute to reducing the risk of nuclear war, such as improvements to the DCL and the establishment of a bilateral

30. In June 1989 another CBM was signed: the bilateral Agreement on the Prevention of Dangerous Military Activities (PDMA), which is similar in approach to the INCSEA agreement, but complementary to the latter as it applies to ground and air units.
31. R. Reagan, "Remarks in New York, NY, Before the United Nations General Assembly Special Session Devoted to Disarmament", June 17, 1982.
32. *Department of Defense Authorization Act, 1983*, Public Law 97-252, US Congress, September 8, 1982, section 1123.

military link or a high-speed communications link between capitals and embassies.[33]

Official and unofficial studies conducted as part of this growing interest in risk reduction in the US national security community thus helped to identify a set of options to prevent accidents, misunderstandings and escalation in both peace and crisis time.[34] Among those, the establishment of two risk-reduction centers – intended to serve as channels of communication to exchange information about incidents and accidents, and to notify about potentially dangerous military activities –, proposed by several experts,[35] started to be discussed bilaterally after the Reagan-Gorbachev summit in Geneva in November 1985. Since both leaders were satisfied by the progress made during the discussions, they agreed in Reykjavik in October 1986 to start formal negotiations, which led to the signature in September 1987 of the Agreement on the Establishment of Nuclear Risk Reduction Centers (NRRCs).[36]

As the arms-control negotiations between the Soviet Union and the United States achieved critical progress, starting with the INF Treaty signed in December 1987, the NRRCs established by the September 1987 agreement progressively became an important element of the bilateral – and later multilateral – arms-control and confidence-building architecture crafted at the end of the Cold War. While, upon activation in April 1988, the NRRCs only transmitted notifications of ballistic missile launches, as stipulated by both the 1971 Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War and the 1972 INCSEA agreement, they became the central channel of communication related to the implementation of CBMs and arms-control agreements as they were signed and entered into force: the INF treaty and the May 1988 agreement on notifications of launches of ICBMs and SLBMs[37] were followed and completed by major agreements (START,

33. C. W. Weinberger, *Direct Communications Links and Other Measures to Enhance Stability*, Washington, D.C., Department of Defense, Report to the Congress, 11 April 1983, top secret.
34. For unofficial proposals, see B. M. Blechman (ed.), *Preventing Nuclear War: A Realistic Approach*, Bloomington, IN: Indiana University Press/Center for Strategic and International Studies, 1985; G. T. Allison, A. Carnesale and J. S. Nye, "An Agenda for Action" in: G. T. Allison, A. Carnesale and J. S. Nye (eds.), *Hawks, Doves and Owls: An Agenda for Avoiding Nuclear War*, New York, NY: W. W. Norton and Co., 1985, pp. 223-246.
35. See R. K. Betts, "A Joint Nuclear Risk Control Center" in: B. M. Blechman (ed.), *Preventing Nuclear War*, *op. cit.*, pp. 65-85; B. M. Blechman and M. Krepon, *Nuclear Risk Reduction Centers*, Washington, D.C.: Center for Strategic and International Studies/Georgetown University, 1986.
36. Agreement on the Establishment of Nuclear Risk Reduction Centers, Washington, September 15, 1987.
37. Agreement between the United States and the Union of Soviet Socialist Republics on Notifications of Launches of Intercontinental Ballistic Missiles and Submarine-Launched Ballistic Missiles, Moscow, May 31, 1988.

CFE, Vienna Document, Open Skies Treaty, New START, etc.) which were all monitored through the NRRCs.[38]

Risk reduction after the Cold War

As the rivalry between the great powers waned and new sources of threat appeared, including threats resulting from the dismantlement of the Soviet Union (theft and trafficking of WMDs, loss of control over parts of the former-Soviet nuclear arsenal, etc.), the global security agenda increasingly focused on different priorities. The traditional approach to nuclear risk reduction continued for a time. At the conventional level of the European theater, the massive cuts in force structures and the intrusive verification regime that were introduced by the CFE Treaty were complemented by confidence-building measures through the 1990 Vienna Document, which was updated several times between its original version and its latest one, approved in 2011. At the bilateral level, the last major element of the nuclear risk-reduction agenda was the 1991-1992 Presidential Nuclear Initiatives (PNIs), a series of reciprocal unilateral moves made by US (George H. W. Bush) and Soviet/Russian leaders (Mikhail Gorbachev and Boris Yeltsin) that led them to dramatically cut down their nuclear-force levels, particularly their nonstrategic systems, to slow or abandon several modernization programs, and to reduce alert levels for strategic bombers.[39]

That being said, the importance given to classic arms control and nuclear CBMs dropped as unipolarity and the peace-dividends theory replaced an era of bipolarity marked by almost constant hostility between nuclear-armed great powers, repeated crises and wars by proxies. Following these deep geopolitical changes, the risk-reduction diplomatic agenda, which used to be mostly focused on bilateral risks of escalation, was increasingly complemented to embrace new priorities, transitioning from a largely bilateral framework to a multilateral one. Apart from the PNIs, the post-Cold War nuclear risk-reduction discussion broadened in terms of both priorities and participants, as countries beyond the United States and Russia, including many non-nuclear countries, and nongovernmental organizations, contributed to reshaping the agenda by focusing instead on reinforcing the norms against the proliferation of WMDs and their means of delivery, to reduce the risks of WMD terrorism, as well as more

38. *United States Nuclear Risk Reduction Center (NRRC)*, Washington, D.C.: Department of State, October 2012.
39. S. J. Koch, *The Presidential Nuclear Initiatives of 1991-1992*, Washington, D.C.: National Defense University/Center for the Study of Weapons of Mass Destruction, 2012.

humanitarian goals such as mitigating sources of excessive harm, or more ambitious objectives such as total nuclear disarmament.[40]

During the 1990s, reducing WMD proliferation risks rapidly took precedence over traditional nuclear risk-reduction. Post-war inspections conducted in Iraq, as part of the UN Special Commission (UNSCOM) established by UN Security Council Resolution 687, revealed early in the 1990s how advanced the Iraqi WMD program was, highlighting the limits of the nonproliferation regime and the urgent need to strengthen it, which led to the diplomatic efforts to achieve the indefinite extension of the NPT at the 1995 Review Conference. The threat posed by non-state actors, trafficking in nuclear technologies and materials, and clandestine programs that might lead to regional proliferation, led to a series of new diplomatic efforts, from the 1991 Nunn-Lugar Cooperative Threat Reduction program in the post-Soviet space to UN Security Council Resolution 1540 and the Nuclear Security summits held between 2010 and 2016.[41]

The renewed energy put behind the goal of nuclear disarmament (as opposed to arms control), at least on the part of some NGOs and non-nuclear-weapon states, also gave birth to a much more ambitious and radically different line of thinking about nuclear risks. The Cold War approach to risk reduction aimed first and foremost at *managing* the risk of a loss of control over nuclear weapons, either in the technical sense (accidental launch or detonation) or, most importantly, in the operational and strategic sense (attack assessment, inadvertent escalation, unstable crisis dynamics, etc.). After 1989, the end of the Cold War and the re-examination of cases of incidents, false warnings and "near-misses" resulted in growing attention to issues of nuclear command, control, and communication systems that emphasized the value of restraint in terms of alert postures and on declaratory policies.[42]

While arms control and deterrence emerged as deeply complementary lines of effort, the 25-year parenthesis during which existential threats to nation states appeared almost extinct unsurprisingly led many to challenge the very relevance of that complementarity, and to adopt a more absolute view of nuclear risks, thus paving the way for more dogmatic policy

40. I. Anthony, "Reflections on Continuity and Change in Arms Control" in: *SIPRI Yearbook 2006*, Oxford: Oxford University Press, 2006, pp. 587-606; S. Croft, *Strategies of Arms Control: A History and Typology*, Manchester: Manchester University Press, 1996.
41. See, for instance, G. T. Allison *et al.*, *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, Cambridge, MA: MIT Press, 1996.
42. B. G. Blair, *The Logic of Accidental Nuclear War*, Washington, D.C.: The Brookings Institution, 1993; P. Lewis *et al.*, *Too Close for Comfort*, *op. cit.*; S. D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons*, Princeton, NJ: Princeton University Press, 1993.

recommendations.[43] Whereas the historical approach to risk reduction saw risk as the result of a situation of latent conflict between great powers equipped with nuclear weapons, a number of nuclear disarmament advocates took the view that *the very existence of nuclear weapons was a risk in itself*, isolated from the existence or absence of conflict situations. Twenty years after the end of the Cold War, this view of nuclear risk became the center of the "humanitarian campaign" to ban nuclear weapons.[44]

While risk reduction efforts were reoriented under the influence of nuclear disarmament advocates, the initial approach to nuclear risk reduction persisted in a specific regional context. The rising tensions between India and Pakistan following the 1998 nuclear tests illustrated both a changing nuclear landscape with a rising number of actors, and the enduring relevance of the historical approach to nuclear risk reduction. Even before the nuclear tests themselves, soon followed by the 1999 Kargil war, India and Pakistan had started to go through their own cycle of learning, based on both their experience of managing several crises and the lessons they drew from the two superpowers during the Cold War.[45] While the South Asian setting differs in multiple ways from the Cold War one, the risk-reduction intellectual and operational frameworks inherited from the 1970s and 1980s were still deemed worthy of an attempt at partial transfer to the South Asian subcontinent.[46]

A number of confidence-building measures between India and Pakistan have since then been signed.[47] These measures are steps in the right direction but have fallen well short of what is needed. Despite some initial positive effects at a political level, the agreements put in place do not appear

43. See, for instance, Global Zero Commission on Nuclear Risk Reduction, *De-alerting and Stabilizing the World's Nuclear Force Postures*, Washington, D.C.: Global Zero, April 2015; International Commission on Nuclear Non-proliferation and Disarmament, *Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers*, Canberra/Tokyo: November 2009.

44. See T. Caughley and W. Wan, "Understanding Nuclear Weapon Risks" in: J. Borrie, T. Caughley and W. Wan (eds.), *Understanding Nuclear Weapon Risks*, *op. cit,* pp. 11-22.

45. F. Hassan Khan, R. Jacobs and E. Burke (eds.), *Nuclear Learning in South Asia: The Next Decade*, Monterey, CA: Naval Postgraduate School, 2014.

46. M. Krepon, "Is Cold War Experience Applicable to Southern Asia?" in: M. Krepon (ed.), *Nuclear Risk Reduction in South Asia*, New York, NY: Palgrave Macmillan, 2004, pp. 7-18.

47. The 1989 Agreement on the Prohibition of Attack against Nuclear Installations and Facilities, which requires both parties to exchange every year the list of nuclear facilities on their territory; the 1991 Agreement on Prevention of Airspace Violations and for Permitting Overflights and Landings by Military Aircraft, Agreement on Advance Notification on Military Exercises, Maneuvers and Troop Movements and Upgrade to the 1965 hotline communications between the Directors General of Military Operations; 1999 Lahore Memorandum of Understanding, which introduces a regime of strategic restraint and later led to the 2005 Agreement on advance notification of ballistic missile tests and to the 2007 Agreement on reducing the risk of accidents relating to nuclear weapons, extended until 2022 in 2017. M. Krepon, "South Asia Confidence-Building Measures (CBM) Timeline", Stimson Center, April 14, 2017, available at : www.stimson.org.

to have been central to the successful de-escalation of the repeated crises that occurred since the end of the Cold War. At times, a crisis even erupted right after the CBM agreement had been signed, as was the case with the 1999 Kargil war that started only a few months after the Lahore memorandum of understanding was concluded.

In practice, some of those risk-reduction measures delivered at least part of their expected benefits in the midst of worsening rivalry, and sometimes even in the midst of war. For instance, while the direct channels of communications established at the political (prime ministers, foreign secretaries) and military (director-general of military operations, DGMOs) levels were used only belatedly during the 1987 Brasstacks crisis, they were helpful in alleviating concerns, lifting some misunderstandings and keeping dialogue open during both the 1990 Kashmir crisis and the 1999 Kargil war.[48] Furthermore, the 2005 agreement on advance notification of ballistic missile tests seems to have been faithfully implemented by both sides. No evidence that one party has failed to fulfill its obligations has yet surfaced.[49] This success, albeit limited, is particularly important considering the high number of ballistic missiles flight-tested each year since the agreement was signed.[50] Its implementation may at least have mitigated the level of concern and instability caused by the growing number of long-range conventional and nuclear strike options present in both countries, which might otherwise have added to the risks of misperception and accidental escalation.

Ultimately, the South Asian case illustrates both the benefits of risk-reduction measures and the limits of what they can achieve in the midst of active and intense rivalry between two nuclear-armed neighbors. Risks of nuclear escalation have to be considered as the product of a conflict between parties, and cannot be understood without taking into account its intensity and dynamics. Furthermore, while some risks of escalation result from structural instability and the potential for misunderstanding, some are the result of deliberate strategies adopted by countries hoping to extract a political-strategic benefit from such escalation, as will be discussed further below.

48. P.R. Chari, P. I. Cheema and S. P. Cohen, *Four Crises and a Peace Process*, Washington, D.C.: Brookings Institution Press, 2007, pp. 48-50, 91-93, 122-123.
49. T. Dalton, *Beyond Incrementalism: Rethinking Approaches to CBMs and Stability in South Asia*, Washington, D.C.: Stimson Center and Carnegie Endowment for International Peace, 2013, p. 8.
50. For instance, between January 2016 and March 2017, Franck O'Donnell numbers a total of 11 ballistic missile launches from either India or Pakistan. F. O'Donnell, "Launching an Expanded Missile Flight-Test Notification Regime", Washington, D.C.: Stimson Center, March 2017. In 2015, India alone conducted 8 flight-tests of ballistic missiles of various ranges. S. Patil, "India's Ballistic Missile Tests in 2015", Mumbai, Gateway House: Indian Council on Global Relations, February 2016.

Thinking Strategically about Risk Reduction

There are several reasons why it matters today to adopt a strategic approach to reduce risks of nuclear use, as emphasized by the G7 countries in their April 2019 Statement on Non-Proliferation and Disarmament, which underlined the contribution of strategic risk-reduction measures to regional and international security.[51] This chapter explores how the philosophy behind such an approach might differ from other existing studies on nuclear risk reduction and what its specific characteristics might be. It starts by emphasizing the unique character of risks that result from the dialectic of conflict, and thus the need to focus efforts on mitigating the consequences of the security dilemma. It then highlights the need to take into account the ambivalent character of risk in strategy, which reflects the fact that states can create and exploit risks, as much as they can fear them and try to prevent them. More importantly, the chapter stresses that all risks of nuclear weapons use are not the same, nor do they all carry the same consequences. Adopting a strategic approach to risk reduction thus implies a better appreciation of the contextual factors that increase substantially the risk of nuclear weapons use, on which risk-reduction efforts should focus.

What risks?

Although the concept of nuclear risk reduction has been used with increasing frequency, it still suffers from a lack of common definition.[52] While there have been some recent helpful attempts to categorize nuclear risks,[53] one cannot help but notice the extreme diversity of the risks identified, from accidents involving nuclear weapons due to poor training or procedures, to unauthorized launch of a ballistic missile, military blunder in crisis time that leads to an attack on nuclear-capable platforms, or a deliberate attack on non-nuclear platforms that unexpectedly triggers a nuclear response. These challenges have very little in common apart from the fact that they deal with

51. *2019 G7 Statement on Non-Proliferation and Disarmament*, Biarritz, April 6, 2019, available at: www.elysee.fr.

52. The ambiguity surrounding the meaning and perimeter of nuclear risk reduction has undoubtedly played a role in ensuring its growing salience among various stakeholders despite their diverging views and priorities – from the alerting of nuclear forces and risks of conventional instability to the delegitimization and stigmatization of nuclear weapons.

53. W. Wan, *Nuclear Risk Reduction. A Framework for Analysis*, *op. cit.*

nuclear weapons and would have negative security consequences if they were to happen:

- The challenges they reflect can be organizational, strategic, technological or behavioral in nature.
- Some of these risks would be the result of a conflict dynamic between two opposite parties; others would be the product of technical malfunction or poor stewardship of nuclear weapons and associated systems.
- The types of corrective measures they can require have nothing in common, as some can only be solved through bilateral engagement while others involve secretive measures that could not and should not be handled through international cooperation.

Types of Nuclear Weapon Use Scenarios[54]

Pathway	Definition	Examples
Doctrinal Use	In accordance with declaratory policies and ambiguities thereof	▪ Following nuclear attack ▪ Existential threat to the State
Escalatory Use	Linked to ongoing conflict or crisis, rising to nuclear use	▪ Pre-emptive strike ▪ Battlefield situations
Unauthorized Use	Non-sanctioned use or use by non-State actors	▪ Rogue domestic actors ▪ Nuclear terrorism
Accidental Use	Linked to error	▪ Technical malfunction ▪ Driven by false alarm

It is beyond dispute that nuclear weapons can pose a threat at both the individual and collective levels, and no risk associated with nuclear weapons can ever be so insignificant that it does not warrant a dedicated effort aimed at reducing it to its absolute minimum, compatible with national and global security. Strengthening security through predictability and communication

54. *Ibid.*, p. 8.

in the face of current and anticipated strategic threats should remain the ultimate goal of risk-reduction measures.

A one-size-fits-all approach to nuclear risk reduction, however, appears not only unfeasible but misguided, as there might be incompatibilities and trade-offs between different risk-reduction measures, or between risk-reduction measures and war-prevention mechanisms. For instance, while the option of de-alerting postures by demating nuclear warheads from delivery vehicles looks appealing to some observers, the implementation of such a measure would create new risks of a different nature - in practice, it would trade one risk for another. From a US perspective, since the changes in alert practices agreed as per the 1991-1992 Presidential Nuclear Initiatives, each administration has rejected calls for further de-alerting, with the argument that it would reduce the available decision time for leaders and increase the vulnerability of nuclear retaliatory force to a first strike.[55] More globally, even a joint decision by all nuclear weapons possessors to demate their nuclear warheads from delivery vehicles would, in practice, increase insecurity as it would make nuclear forces deeply vulnerable to conventional attacks. Considering the high levels of conventional imbalances that characterize most dyads of nuclear-armed countries (US-DPRK, US-Russia, Russia-China, India-China, India-Pakistan, etc.) and the widespread and growing capacity to conduct long-range conventional strikes, demating nuclear arsenals could in practice reintroduce pre-nuclear levels of instability with new levels of conventional lethality – the worst of both worlds.

It thus appears necessary to define priorities among the challenges that ought to be the focus of risk-reduction measures. Paradoxically, the literature on nuclear risk reduction tends to be both too broad, in seeking to tackle challenges of fundamentally different natures, and too narrow, since it often treats nuclear risks in isolation from their operational, strategic and political environment. Two sets of reasons, at least, make it crucial to focus on the specific risks posed by the *interactions between adversarial nuclear weapons possessors*, particularly during crises.

First, risks resulting from conflict dynamics differ substantially from those resulting from error and mismanagement. One essential difference is that risks resulting from a conflict dynamic are not only unintentional; they can be deliberately created and exploited by a belligerent in order to subdue its opponent and achieve its objectives. As a consequence, their escalatory potential is incomparably higher than that of technical incidents. A strategic

55. R. Hersman, W. Caplan and B. Thompson, “Bad Idea: De-Alerting U.S. ICBMs”, Center for Strategic and International Studies, December 2017.

approach should acknowledge this dual nature of risk, and consider cooperative risk-reduction measures as one element in a more comprehensive effort that would deal with both risk-exploitation strategies and unintentional risks, and in which risk reduction should be complemented by both arms control and credible deterrence policies.

Second, a strategic approach to risk reduction should not ignore the risks associated with mismanagement, technical malfunction and error, but focus on how they would interact with a conflict dynamic, either by shaping the latter (increasing pressure toward fast escalation) or by being shaped by it (changes in alert levels and command and control arrangements). More broadly, the political and strategic context cannot be isolated from our understanding of the nature of nuclear risks as it is ultimately what fuels them. The spectrum of intensity of international tensions between two nuclear powers (from peaceful cooperation to active war), the balance of forces between the two, the existence or absence of cooperative security architectures (arms-control treaties and CBMs particularly) should *inter alia* be taken into account when assessing the salience of a particular type of nuclear risk.

Risk and the security dilemma

Schelling and Halperin wrote in 1961 that arms control includes "all the forms of military cooperation between potential enemies in the interest of reducing the likelihood of war, its scope and violence if it occurs, and the political and economic costs of being prepared for it".[56] The essence of arms control can thus be defined as a cooperative approach through which several parties seek to strengthen their security by accepting mutual constraints on specific dimensions of their military power and ways to use it. Risk reduction was an important part of that effort during the Cold War as it was pursued in parallel with formal arms-control measures focusing on hard constraints on nuclear capabilities, as well as with deterrence policies.

The security dilemma results from the uncertainty surrounding the intentions of other countries. According to the authors who conceptualized it, two parties with no malign intentions can nevertheless be driven toward

56. T. C. Schelling and M. H. Halperin, *Strategy and Arms Control*, *op. cit.,* p. 2. Hedley Bull followed a very similar approach, by defining arms control as "all those acts of military policy in which antagonistic states cooperate in the pursuit of common purposes even while they are struggling in the pursuit of conflicting ones". H. Bull, *The Control of the Arms Race*, New York, NY: Praeger, 1965 (1961), p. xiv.

competition due to structural constraints fueling mutual misunderstanding:[57]

> "When states seek the ability to defend themselves, they get too much and too little – too much because they gain the ability to carry out aggression; too little because others, being menaced, will increase their own arms and so reduce the first state's security. Unless the requirements for offense and defense differ in kind or amount, a status quo power will desire a military posture that resembles that of an aggressor. For this reason others cannot infer from its military forces and preparations whether the state is aggressive. States therefore tend to assume the worst."[58]

This dilemma drove concerns about risk reduction throughout the Cold War, by making states aware of the need to engage in a form of restraint and transparency so as to strengthen their security by reducing the probability that steps taken by each party to protect itself actually end up fueling an escalatory dynamic.

The security dilemma can manifest itself both in peacetime and in crisis time. Its peacetime dynamics have been particularly visible, for instance, in US-China relations since the end of the Cold War. US investments in ballistic missile defense meant to counter threats coming from North Korea and Iran have been perceived in Beijing as directed against China, incentivizing it to build a more robust nuclear deterrent, which in return has been perceived by some in the US, and other countries, as evidence that Beijing was pursuing a more ambitious nuclear policy.[59]

The security dilemma tends to be more or less acute depending on available military technologies, but most importantly depending on the state of political relations. The reduced tensions between great powers after the end of the Cold War explain to a large extent why the dilemma appeared less acute. Not all sources of disagreement between Washington and Moscow disappeared after the Cold War, however: NATO's air war against the Federal Republic of Yugoslavia in spring 1999, the US decision to withdraw from the ABM treaty in December 2001, and the 2008 war between Russia and Georgia did cause tensions in bilateral relations, as well as occasional threats. Nevertheless, after the September 11, 2001 attacks, US security

57. J. Herz, "Idealist Internationalism and the Security Dilemma", *op. cit.*; R. Jervis, "Cooperation Under the Security Dilemma", *op. cit.*.

58. R. Jervis, *Perception and Misperception in International Politics*, Princeton, NJ: Princeton University Press, 1976, p. 64.

59. On the consequences of the security dilemma for regional military dynamics, see A. P. Liff, G. John Ikenberry, "Racing Toward Tragedy? China's Rise, Military Competition in the Asia-Pacific, and the Security Dilemma", *International Security*, Vol. 39, No. 2, Fall 2014, pp. 52-91; on the nuclear dimension specifically, see B. Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century*, Stanford: Stanford University Press, 2016, pp. 154-155.

concerns were essentially focused on counterterrorism and counterinsurgency operations in the Middle East and Central Asia, and strategic competition between great powers took a back seat. The 2010 US Nuclear Posture Review reflected the predominant view when it stated that "the likelihood of major nuclear war has declined significantly".[60]

This picture has dramatically changed since 2014, following Russia's annexation of Crimea and destabilization of Eastern Ukraine, and the growing strategic ambition displayed by Chinese leaders, which led many in Washington to worry about the narrowing of the economic, technological and military gap with the US and the unique challenge China might pose to the current geopolitical order. The assertiveness of Moscow and Beijing has brought them to challenge the territorial and political status quo through strategies combining strategic intimidation, ambiguity, *fait accompli* tactics, and information warfare. With the re-emergence of geopolitical tensions between nuclear powers a security dilemma more intense than in the previous two decades has reappeared. Even though perceptions of the risk of major war in Europe and the political stakes in the ongoing tensions still remain far from Cold War levels, the theoretical potential for incidents has become greater as operational activity (exercises, air and maritime patrols, gray zone tactics in space and cyberspace, operations in Syria) increased on both sides.[61]

In crisis time, the security dilemma manifests itself in ways that differ from peacetime, and tend to make escalatory risks even more acute. Indeed, while in peacetime uncertainty surrounds each party's basic intentions, making it difficult to characterize a hostile ambition, in crisis time this hostility has already been made at least partly clearer through the concrete military steps taken and the demands made by each party – irrespective of whether or not an aggressive ambition existed initially. In the case of US-China relations, factors such as stark asymmetries in military capabilities, geography, deeply ingrained strategic beliefs and lack of bilateral crisis communication habits would indeed weigh heavily on crisis dynamics and increase the risk of escalation.[62]

60. *2010 Nuclear Posture Review Report*, Washington, D.C.: Department of Defense, April 2010, p. 45.
61. On the erosion of strategic stability in Europe, see C. Brustlein, "The Erosion of Strategic Stability and the Future of Arms Control in Europe", *Proliferation Papers*, No. 60, Ifri, November 2018, pp. 26-37; L. Kulesa, "The Crisis of Nuclear Arms Control and Its Impact on European Security", *op. cit.*; B. Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century*, *op. cit.*, pp. 106-140. On Russia's strategic resurgence since 2014, see D. Adamsky, "Cross-Domain Coercion: The Current Russian Art of Strategy", *Proliferation Papers*, No. 54, Ifri, November 2015.
62. For a balanced view, see A. Goldstein, "First Things First: The Pressing Danger of Crisis Instability in U.S.-China Relations", *International Security*, Vol. 37, No. 4, Spring 2013, pp. 49-89.

These heightened tensions between Russia and NATO happened against the backdrop of a transformed technological and operational landscape that appears likely to make crisis dynamics more unstable. Trends such as the growing number of high-precision, long-range conventional strike systems, the unique salience of cyber and electronic warfare challenging information superiority and command and control systems, the growing level of ambition of missile defense policies, each party's emphasis on offsetting capabilities, and the increasing number of ambiguous attack options, all have in common their potentially damaging effects on crisis stability at the conventional and nuclear levels.[63]

These multiple developments make it necessary to refocus risk reduction on what used to be its initial concern when it emerged during the Cold War: mitigating the consequences of the security dilemma between major powers in the nuclear age.

Strategy, risks, and nuclear use

Adopting a strategic approach to risk reduction requires acknowledging *the ambivalent nature of risk* in a conflict of wills. In a situation of conflict, risks are both the reflection of the complexities inherent in the organizations in charge of protecting nations, and the byproduct of the very dynamic created by the interaction between two opponents, an interaction that generates its own kind of chaos. But the unique character of conflict extends beyond that point, since risk is not a mere byproduct of a given situation; rather it is also an element of conflict that all parties can be tempted to exploit to further their interests and achieve their objectives.

The essence of conflict is the existence of opposition between two adversaries that pursue different objectives – sometimes diametrically opposed but not necessarily. There is something unique about the dynamic that appears while each belligerent tries to impose its will on its adversary.[64] As Carl von Clausewitz conceptualized in *On War*, the specific characteristic of action in a conflict situation is that the adversary keeps adapting and reacting according to its own objectives, plans and perceptions. Hence, "war [...] is not the action of a living force upon a lifeless mass [...] but always the

63. C. Brustlein, "The Erosion of Strategic Stability and the Future of Arms Control in Europe", *op. cit.*, p. 30ff; J. N. Miller, Jr. and R. Fontaine, *A New Era in U.S.-Russian Strategic Stability: How Changing Geopolitics and Emerging Technologies Are Reshaping Pathways to Crisis and Conflict*, Washington, D.C.: Center for a New American Security, November 2017, pp. 16-34.

64. Following André Beaufre's definition of strategy as the "art of the dialectic of two opposite wills using force to resolve their dispute". A. Beaufre, *An Introduction to Strategy*, New York, NY: Frederick A. Praeger, Inc., 1965, p. 22. For an analysis of the dialectical dynamic of strategy, see E. N. Luttwak, *Strategy. The Logic of War and Peace*, Cambridge, MA: Harvard University Press, 1987.

collision of two living forces".[65] The very presence of a thinking adversary striving to achieve its own objectives means not only that every simple task becomes more complex, as it has to be executed in a fog of uncertainty surrounding the adversary's intentions, plans, and capabilities, but that every move can be anticipated, exploited and countered by the same adversary, preventing it from achieving its intended effects. Due to the dialectical nature of strategy, the success of a given action cannot be guaranteed in absolute terms, but will always remain relative to the other party's intentions and reactions. Dealing with a problem of a strategic nature, as opposed to a physics or engineering problem, thus requires constant adaptation to a situation that follows neither laws nor any constant principle.[66]

States parties to a conflict don't simply *face* risks, they also actively *create* them and *manipulate* them in order to coerce or deter their adversary, and thus achieve their goals.[67] *As long as parties to a conflict face at least some risks together, risk reduction will remain a promising line of effort. Although risk reduction is necessary to prevent the worst from happening due to accident or misunderstanding, it remains insufficient by itself to prevent it from happening by design or through brinkmanship.*

Strategy is about imposing one's will to an adversary, creating and manipulating risks of destruction, escalation, and defeat has been and will remain central to its practice, and serve various political purposes – from deterrence and self-defense to strategic compellence[68]. Although the actual use of force might sometimes be necessary, states try to influence their adversaries' behaviors by solely resorting to threats, particularly so in the nuclear era, as the value of brute force decreased due to the risk of nuclear escalation. The advent of nuclear weapons turned the Cold War into a succession of international crises, and thus into repeated contests of political wills and attempts at brinkmanship under the threat of nuclear escalation.[69]

65. C. von Clausewitz, *On War*, Princeton, NJ: Princeton University Press, 1976, p. 77.
66. E. N. Luttwak, *Strategy. The Logic of War and Peace*, Cambridge, MA: Belknap Press of Harvard University Press, 1987.
67. T. C. Schelling, *Arms and Influence*, *op. cit.*, pp. 92-125.
68. D. Byman and M. Waxman, *The Dynamics of Coercion: American Foreign Policy and the Limits of Military Might*, Cambridge: Cambridge University Press, 2002, pp. 3-9. See also R. J. Art and K. M. Greenhill, "Coercion. An Analytical Overview" in: K. M. Greenhill and P. Krause (eds.), *Coercion: The Power to Hurt in International Politics*, Oxford: Oxford University Press, 2018, pp. 3-32.
69. Brinkmanship has been defined by Schelling as "the deliberate creation of a recognizable risk of war, a risk that one does not completely control. It is the tactic of deliberately letting the situation get somewhat out of hand, just because its being out of hand may be intolerable to the other party and force his accommodation. It means harassing and intimidating an adversary by exposing him to a shared risk, or deterring him by showing that if he makes a contrary move he may disturb us

Immersed in a fog of uncertainty and with their political goals in mind, states may enter a competition for risk-taking through successive commitments, progressively increasing the level of danger in order to force the other to back down. While countries enjoying a favorable balance of forces can try to rely on risk-minimizing strategies exploiting their ability to control escalation by responding to any hostile initiative, countries that do not enjoy such an advantageous position may have to rely on other approaches to bargaining, relying on the risk of loss of control, and thus on brinkmanship, to coerce their adversary. As a matter of fact, states generally have to resort to both approaches depending on the circumstances.[70] Whether it has been successful in helping to attain political objectives or not, nuclear brinkmanship has been used repeatedly throughout the Cold War as well as since then.[71]

While it is easily portrayed as an irrational strategy, brinkmanship is not the problem *per se*, as it can in practice be used to further either defensive political goals or revisionist aims. The point is broader than this, as the same can be said more generally about the use of nuclear signaling. Would any threat of nuclear weapons use be necessarily irresponsible or fuel insecurity? Nuclear threats can support either a *deterrence* strategy, aiming at preserving vital interests, or a *compellence* strategy, which aims at changing the status quo. *Portraying these two fundamentally different practices as intrinsically dangerous without considering the nature of the political motives that would underpin a decision to invoke the risk of nuclear use in a crisis mischaracterizes the source of the risk. More importantly, it would neglect the fundamental difference, recognized by international law, between the use of force for the purpose of self-defense and its use for the purpose of aggression.* Relying on nuclear brinkmanship to change the political or territorial status quo, as part of a strategy of compellence, cannot be considered to be morally and legally identical to deterrence, which relies on the threat of retaliation for the purpose of self-defense.[72]

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so that we slip over the brink whether we want to or not, carrying him with us". T. C. Schelling, *The Strategy of Conflict*, *op. cit.*, p. 200.

70. Although Richard Betts draws the distinction between those two approaches, he argues that the practice of US foreign policy during Cold War crises followed a path that generally remained between those two extreme options. See R. K. Betts, *Nuclear Blackmail and Nuclear Balance*, Washington, D.C.: The Brookings Institution, 1987, pp. 11-16.

71. For a skeptical view about the effectiveness of brinkmanship, see T. S. Sechser and M. Fuhrmann, *Nuclear Weapons and Coercive Diplomacy*, Cambridge: Cambridge University Press, 2017.

72. See, for instance, N. L. Highsmith, *On the Legality of Nuclear Deterrence*, Livermore, CA: Center for Global Security Research – Lawrence Livermore National Laboratory, 2019, pp. 56-66; M. Quinlan, *Thinking about Nuclear Weapons. Principles, Problems, Prospects*, Oxford: Oxford University Press, 2009, pp. 46-55; N. Roche et H. Tardy-Joubert, "Peut-on réconcilier morale et dissuasion nucléaire ?", *Commentaire*, No. 168, Winter 2019-2020, pp. 795-806.

A strategic approach to risk reduction should thus account for the fundamental ambivalence of nuclear risks; i.e. the fact that they can result from either strategic instability or from a deliberate strategy, and that they can be introduced to support aggression or to prevent wars – the latter having been more effective than the former. While strategic risk-reduction measures can help tackle the challenge posed by strategic instability, they cannot be the main line of effort to prevent aggression, and thus should not be seen as a substitute for other instruments that help impose restraint upon a deliberately hostile and provocative opponent. To put it otherwise, *well-meaning efforts to mitigate the risks of accidental or inadvertent escalation toward nuclear use should not come at the expense of the collective ability to mitigate the risks of war*.[73] In practice, fortunately, *these two lines of effort may not be mutually exclusive*, depending on the measures taken. In this case, one of the greatest potential values of strategic risk-reduction measures, which was demonstrated in the past, is indeed to help decision-makers better discriminate between situations in which the risk of escalation is deliberately created and exploited and those in which it is the product of a misunderstanding.

The primacy of context

When approaching issues such as risks of nuclear use and options to reduce them, it is easy to focus on technical aspects of the problem and to neglect the very dynamic created by the conflict between two opposite wills. The literature on risk management, prevention and reduction, though extremely diverse and abundant, only marginally relates to war, escalation dynamics and military matters. Risk analysis is applied to all sorts of domains in which an event can potentially negatively affect one's interests – whether it concerns the stock market, supply chains, industrial safety, global pandemics, or massive thunderstorms. This approach assumes that risk is quantifiable, an unequivocally negative event whose probability of occurring can be reduced through technical fixes or organizational optimization.

Such an approach, however, does not take into account either the competitive and thus dialectical aspect of strategy, or the centrality of political stakes. The dialectical nature of conflict means that it is impossible to quantify a risk such as the probability of nuclear use in a given context: the factors to be taken into account are too numerous and diverse to lend themselves to quantification. Furthermore, how could one quantify a risk

73. For a similar argument that also illustrates how the Obama Administration struck a balance between risk-reduction measures and the credibility of extended deterrence, see B. Roberts, "On Adapting Nuclear Deterrence to Reduce Nuclear Risks", *Daedalus*, Vol. 149, No. 2, Spring 2020, pp. 69-83.

based on information that parties to a conflict manipulate to send strategic signals, while resorting to secrecy, concealment, and sometimes deception and information warfare to hide their intentions and capabilities?

The most common definition of a nuclear risk – the product of the magnitude of the danger posed by a possible nuclear weapon use and the probability that it occurs[74] – should logically lead to emphasizing the primacy of context when assessing risks and crafting risk-reduction measures, as neither the magnitude of damage nor the probability of occurrence can be assessed without factoring in contextual elements. While many events usually associated with nuclear risks, such as false warning, tactical error, and ambiguous signaling, could *in theory* trigger a chain of events leading to nuclear weapon use, *context is what determines the escalatory potential of a given trigger*.

The logical consequence is that *there should be more to nuclear risk reduction than measures strictly focused on nuclear weapons*. While the goal of nuclear risk reduction remains to prevent nuclear weapon use, the drivers toward nuclear escalation are not necessarily nuclear in nature, and risk reduction should not remain solely focused on nuclear ones. The practice of crisis management in the Cold War demonstrated multiple times that signaling and maneuvers with nuclear assets were pursued in parallel with signaling and maneuvers with conventional ones, and thus that the fate of non-nuclear assets in actual combat operations could drive belligerents toward a heightened risk of nuclear use.[75] More generally, it is hard to imagine any scenario leading to nuclear use that would not start at the non-nuclear level of conflict, with local incidents involving border patrols, and limited conventional forces. Furthermore, non-nuclear capabilities such as high-end conventional weapons, space and cyber weapons have taken a growing role in security policies and military planning. This trend only reinforces the link between non-nuclear dynamics and the risk of nuclear weapons use. The higher profile of these capabilities in military strategies and the willingness, in the US, Russia, and China, to integrate further conventional and nuclear strategies should lead us to make those capabilities a central part of the risk-reduction agenda.

74. See, among others, P. Lewis *et al.*, *Too Close for Comfort: Cases of Near Nuclear Use and Options for Policy*, *op. cit.*, p. 4; W. Wan (ed.), *Nuclear Risk Reduction: A Framework for Analysis*, *op. cit.*

75. B. G. Blair, "Alerting in Crisis and in Conventional War" in: A. B. Carter, J. D. Steinbruner and C. A. Zraket (eds.), *Managing Nuclear Operations*, *op. cit.*, pp. 75-120; A. B. Carter, "Sources of Error and of Uncertainty" in: A. B. Carter, J. D. Steinbruner and C. A. Zraket (eds.), *Managing Nuclear Operations*, *op. cit.*, pp. 616ff; B. Posen, *Inadvertent Escalation*, *op. cit.*; S. D. Sagan, *The Limits of Safety. Organizations, Accidents, and Nuclear Weapons*, Princeton, NJ: Princeton University Press, 1993, pp. 135ff.

Concrete illustrations of the primacy of context can indeed be found in assessing the dynamics of inadvertent escalation toward nuclear weapons use that can be fueled by conventional operations. The first academic study on this type of risk was conducted by Barry Posen in the 1980s, as the United States military was displaying growing confidence in its ability to control escalation in Europe without resorting to nuclear weapons. Posen argued that large-scale, operationally offensive conventional campaigns, particularly in the air and at sea, combined with the fog of war that characterizes every war and, in particular, such a high-intensity conflict, might inadvertently drive Moscow to resort to nuclear weapons.[76]

What was already identified as a risk throughout the Cold War seems even more important now that options for strategic attacks – capabilities making it possible to cause severe damage or disruption to the point of reaching vital interests – include a variety of non-nuclear means. During the Cold War, strategic attacks were expected to be either nuclear/WMD attacks or large-scale conventional ones. Today, cyber-attacks or unmanned air systems can be used to strike at the heart of societies, and are no longer a monopoly of nuclear weapons possessors. Conventional weapon systems have seen such tremendous advances in terms of lethality that they are given strategic attack missions in a growing number of countries.[77] The trend is in reality much broader, since both offensive and defensive conventional systems can pursue strategic missions (anti-access/area-denial capabilities are a salient example), while the same is true for nonkinetic attack options (cyberwarfare, electronic warfare).[78] The problem of inadvertent escalation has thus continued to change as the level of confidence in conventional

76. B. Posen, *Inadvertent Escalation*, *op. cit.*

77. J. M. Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike*, Washington, D.C.: Carnegie Endowment for International Peace, 2013; C. Brustlein, "Conventionalizing Deterrence? U.S. Prompt Strike Programs and Their Limits", *Proliferation Papers*, No. 52, Ifri, January 2015; M. S. Chase et A. S. Erickson, "The Conventional Missile Capabilities of China's Second Artillery Force: Cornerstone of Deterrence and Warfighting", *Asian Security*, Vol. 8, No. 2, 2012, pp. 115-137; R. Christman, "Conventional Missions for China's Second Artillery Corps", *Comparative Strategy*, Vol. 30, 2011, pp. 198-228; D. Johnson, *Russia's Conventional Precision Strike Capabilities, Regional Crises, and Nuclear Thresholds*, Livermore, CA: Lawrence Livermore National Laboratory/Center for Global Security Research, February 2018; R. N. McDermott and T. Bukkvoll, *Russia in the Precision-Strike Regime: Military Theory, Procurement and Operational Impact*, Kjeller: Norwegian Defence Research Establishment (FFI), August 2017.

78. C. Brustlein, "The Erosion of Strategic Stability and the Future of Arms Control in Europe", *op. cit.*; D. C. Gompert and M. Libicki, "Cyber War and Nuclear Peace", *Survival*, Vol. 61, No. 4, August-September 2019, pp. 45-62; H. Lin, "Escalation Dynamics and Conflict Termination in Cyberspace", *Strategic Studies Quarterly*, Vol. 6, No. 3, Fall 2012, pp. 46-70; J. N. Miller, Jr. and R. Fontaine, *A New Era in U.S.-Russian Strategic Stability*, *op. cit.*

capabilities, the portfolio of non-nuclear strategic attack options and the mingling of conventional and nuclear weapon systems have grown.[79]

The link between the strategic roles of non-nuclear capabilities and escalation risks is complex. The fact that these types of non-nuclear means would achieve lower levels of destructive damage – and generally more discriminate damage, too – leads some experts to believe that nuclear retaliation after a non-nuclear strategic attack would be extremely unlikely.[80] This neglects a number of facts: first, what is seen as discriminate by some can be seen in a different light by others, and thus belligerents that aim at inflicting discriminate levels of damage can still blatantly misrepresent their adversary's critical thresholds. For instance, invoking the threat of nuclear retaliation following a massive cyberattack may appear unrealistic but should not be dismissed altogether as such an attack could durably cripple information systems that are vital to a modern society. Second, these strategic attack capabilities are not a US monopoly, but have become widespread: all nuclear-armed countries possess them, as well as many other countries. Whether it is meant as a warning to re-establish deterrence or for the purpose of compellence, a discriminate non-nuclear attack can still set off an escalation dynamic in which the scale of destruction gradually increases to the point where a belligerent's vital interests might be at stake, leading him to consider a nuclear response. Thus, a non-nuclear attack could matter less because of its immediate effects than because of its potential consequences on the escalation dynamic.

Risk-reduction measures could tackle some aspects of this challenge – whether through reciprocal commitments of doctrinal restraint, channels for crisis communications or norms of behavior. But risk-reduction measures are part of a portfolio of measures, unilateral and cooperative, through which states can strengthen both national security and global strategic stability. Crafting risk-reduction measures without a thorough understanding of the dynamics of conflict that might lead to nuclear escalation can alter the effectiveness of other policies in place, such as the ability of nuclear deterrence to prevent direct aggression and channel conflict. Attention to context thus appears critical to ensure that the

79. See *inter alia*, J. M. Acton (ed.), *Entanglement. Russian and Chinese Perspectives on Non-Nuclear Weapons and Nuclear Risks*, *op. cit.*; J. M. Acton, "Escalation through Entanglement", *op. cit.*; C. Talmadge, "Would China Go Nuclear? Assessing the Risk of Chinese Nuclear Escalation in a Conventional War with the United States", *op. cit.*

80. See, for instance, D. Kimball, "Taking First-Use of Nukes Off the Table: Good for the United States and the World", *War on the Rocks*, July 14, 2016, available at: https://warontherocks.com; J. B. Steinberg, "Expanding the Options and Lowering the Threshold for Nuclear Weapons", *Texas National Security Review*, February 13, 2018, available at: https://tnsr.org.

measures taken to help mitigate the risk do not work to the detriment of other missions essential to global and national security.

Some illustration of the primacy of context can be found by taking the example of a risk of nuclear escalation that has been identified by the policy and expert communities: the possibility that a conventional strike by a nuclear weapons possessor against another nuclear country's ground-based, dual-capable missile launcher might lead to escalation toward nuclear weapons use.[81] In isolation, this case appears as the epitome of risks of nuclear use in an era of dual-capable systems and capabilities, prompt non-nuclear attack options, and time-pressure on decision-makers. In truth, even in such a specific scenario, it is crucially important to keep in mind the number and diversity of contextual variables involved in the decision to consider a nuclear response (see Box 1, p. 41.).

This list could be supplemented by many other factors at the strategic, operational or even technical level, in order to assess in detail whether a specific course of action would lead to the use of nuclear weapons. A much longer and even more diverse list of variables would have to be established when assessing the chances that events such as an accident, or a warning wrongly announcing a ballistic missile attack, could by itself trigger a nuclear war.

Understanding nuclear risks also means taking into account not only what encourages rapid escalation, but also what encourages restraint and caution on the part of decision-makers, even in the midst of a crisis. The level of confidence in the survivability of their second-strike capabilities and their command and control systems, and to a lesser extent their confidence in the ability to benefit from early warning and to reliably assess and monitor the attack, would all play a major role in shaping incentives toward restraint and caution.[82]

81. T. Zhao and L. Bin, "The Underappreciated Risks of Entanglement: A Chinese Perspective" in: J. M. Acton (ed.), *Entanglement. Russian and Chinese Perspectives on Non-Nuclear Weapons and Nuclear Risks*, *op. cit.*, pp. 52ff.

82. R. Hersman *et al.*, *Under the Nuclear Shadow. Situational Awareness Technology and Crisis Decisionmaking*, Washington, D.C.: Center for Strategic and International Studies, March 2020. For earlier examination of some of these issues, see P. Bracken, *The Command and Control of Nuclear Forces*, New Haven, CT: Yale University Press, 1983; A. B. Carter, J. D. Steinbruner and C. A. Zraket (eds.), *Managing Nuclear Operations*, *op. cit.*

Box 1. Examples of variables affecting a decision to escalate to nuclear use in a scenario of conventional strike on a dual-capable missile launcher

Strategic-level dimensions

- What is the declaratory policy of the targeted country and what does it say about similar circumstances?
- What have been the signals sent, in peacetime, crisis and war, by the targeted country about the specific role or value of those types of launchers?
- What have been the signals sent by the attacker about the specific purpose of the attack?
- Is the attack unique and isolated or is it part of (1) a more robust air campaign targeting several launchers, or even of (2) a disarming first strike?
- Is there a war going on? What is the balance of stakes between the two parties? Does one country seem to have the upper hand?
- If the strike is not part of an all-out attack, is it seen as limited by the targeted country, and is the latter confident in its ability to characterize the limited or unlimited nature of the attack?
- Does the targeted country possess a survivable nuclear second-strike capability? Does this attack undermine this survivable second-strike capability in one way or another?

Operational-level dimensions

- Does the targeted unit have an acknowledged role in nuclear deterrence?
- Has the target been struck? Is it destroyed? Has another target been mistakenly destroyed?
- How many other similar launchers does the targeted country possess?
- Is the target on national soil or abroad?
- Was the targeted launcher actually carrying nuclear-tipped missiles?
- Was the launcher, or another launcher from its unit, involved in a conventional strike mission just before it was targeted?
- Could the capabilities (platforms and weapons) involved in the strike appear, during their flight, threatening to a critical element of the defender's nuclear forces?

Thus, generally speaking, the factors that would weigh the most on the targeted country's decision to use a nuclear weapon appear to be entirely context-dependent – country-dependent, crisis-dependent, theater-dependent, platform-dependent, and strategy-dependent – and impossible to fully determine in advance.

More importantly, to a large extent, more than simply capabilities and force structure, each party's behaviors and strategies can be the driving factors of escalation. Were it not for behavioral drivers of escalation explicitly related to a given crisis, such as open hostility, aggressive statements, conventional maneuvers and actual military operations, the potential for an isolated incident to lead to nuclear use would remain virtually nonexistent.

The fact that a broader set of parameters is relevant to assessing the probability of nuclear escalation should lead us to encourage risk-reduction strategies broader than solely focused on technical aspects of the posture, but also encompassing behavioral and non-nuclear dimensions such as large-scale conventional exercises, military doctrines, and norms of behavior in space and cyberspace.

Lessons from Fifty Years of Strategic Risk Reduction

Our perspective on strategic risk reduction would benefit from being both broadened to include measures focused on non-nuclear capabilities, and focused on a coherent set of challenges, such as mitigating the effects of the security dilemma by helping to reduce ambiguity surrounding the intent and capabilities of nuclear-armed states. To illustrate those points, the next section looks at the history of risk-reduction measures and their track record during crises and conflicts in preventing or defusing escalation dynamics through transparency, communications and restraint. It highlights five lessons regarding the value of strategic risk reduction in an era of heightened geopolitical competition.

Non-nuclear risk-reduction measures can help reduce nuclear risks

The fact that a wide variety of non-nuclear factors might drive an escalation dynamic was already quite clear during the Cold War. Conventional risk-reduction measures were considered for decades to have a role to play in reducing the risks of nuclear use.[83] This view explains why initial efforts to reduce the risk of nuclear war entailed much more than measures directly related to nuclear weapons, doctrines, or command, control, and communications systems. Non-nuclear risk reduction measures sometimes started delivering on their promise before arms-control treaties started to seriously constrain both superpowers' nuclear force structures.

For instance, the 1972 agreement on the prevention on incidents at sea (INCSEA agreement), although not strictly dedicated to the prevention of nuclear war, contributed both directly and indirectly to that end. The direct contribution came through article VI of the agreement, which requires both parties to provide advance notification of "actions on the high seas which represent a danger to navigation or to aircraft in flight".[84] As per this article, each party has provided advanced notices to airmen and mariners (NOTAM) when ballistic missile launches had a projected impact area over the high

83. A. J. Vick and J. A. Thomson, "The Military Significance of Restrictions on the Operations of Strategic Nuclear Forces" in: B. M. Blechman (ed.), *Preventing Nuclear War*, *op. cit.*, pp. 123-124.
84. Agreement on the Prevention of Incidents on and over the High Seas, Moscow, May 25, 1972.

seas. The INCSEA agreement was not the first confidence-building measure that requested advance notifications for ballistic missile launches, since, under the 1971 Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War, both parties had to notify each other in advance of "any planned missile launches if such launches will extend beyond its national territory in the direction of the other Party" (article IV).[85] In practice, however, both parties seem to have refrained from conducting such types of launches, and would thus have provided no advance launch notification were it not for the INCSEA agreement. The latter, by complementing the 1971 agreement, ensured that the US would obtain some limited data on at least a small number of Soviet ICBM launches, and on most of their SLBM launches.[86] Importantly, considering the inability of the US to conduct missile tests over its own territory, the agreement has ensured that the US would notify the Soviet Union, and later Russia, about every ICBM and SLBM test conducted since 1971.

The indirect contribution of the INCSEA agreement was, in truth, even more important. By establishing new "rules of the road" for the behavior of surface ships and aircraft at sea, the agreement led to a sharp decrease in incidents at sea in a period when such events carried high escalatory potential – for several reasons, such as pre-established patterns of harassment of vessels on intelligence collection duties, first-strike instability at the tactical level, the presence of tactical nuclear weapons onboard a number of surface ships and submarines, and the difficulty for political leaders to keep a clear picture of a remote and fast-changing operational situation, thus increasing the risk of misunderstanding.[87]

The INCSEA agreement illustrates the point that reducing the risk of escalation between nuclear weapons possessors goes beyond taking measures focused exclusively or explicitly on nuclear capabilities. The same can, for instance, be said of the Memorandum of Understanding signed between Russia and the US in October 2015 to minimize the risk of air incidents over Syria.[88] As the air forces of the Russian Federation and of the

85. Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War, Washington, D.C.: September 30, 1971.
86. The declassified 1983 DoD report on DCL and other CBM proposals indicates that, although only 5-10 percent of Soviet ICBM tests were covered by the INCSEA agreement, over 55 percent of Soviet SLBM tests were covered. C. W. Weinberger, *Direct Communications Links and Other Measures to Enhance Stability*, *op. cit.*, pp. 7-8.
87. On the dangers of incidents at sea, see S. M. Lynn-Jones, "A Quiet Success for Arms Control: Preventing Incidents at Sea", *International Security*, Vol. 9, No. 4, Spring 1985, pp. 162-169. On the pattern of behaviors before and after the agreement was signed, see D. F. Winkler, *Cold War at Sea. High-Seas Confrontation between the United States and the Soviet Union*, Annapolis, MD: Naval Institute Press, 2000, pp. 1-66, 118-162.
88. L. Ferdinando, "U.S., Russia Sign Memorandum on Air Safety in Syria", *DoD News*, October 20, 2015, available at: www.defense.gov.

Coalition against ISIS had to operate in close vicinity for years, and considering the very high potential for fast escalation due to the capabilities involved, the establishment of a channel of communication to deconflict airspace use became highly critical. Efforts were deepened and broadened as the war in Syria continued, resulting in the establishment of a 24-hour hotline between the Russian operations center at the Khmeimim airbase, Syria, and both the Combined Air Operations Center in Qatar and the commander of Operation Inherent Resolve.[89]

Strategic risk-reduction measures can positively channel behaviors

The nuclear risk-reduction agreements signed in the 1970s have remained much less visible than arms-limiting treaty-based instruments such as the SALT, ABM and, later on, the INF, START and CFE. While some of those treaties, like SALT, brought very few constraints on the actual numbers of strategic offensive systems, risk-reduction measures such as the DCL and the Incidents at Sea agreements were actually delivering concrete results and reinforcing stability as early as the 1970s. By establishing mutually agreed rules of the road through a negotiation process, these risk-reduction agreements secured a reciprocal commitment to abide by norms of behaviors which, although imperfect, did reorient the behavior of the two superpowers. Not only did they channel involuntary provocative practices toward more responsible habits by making concrete each party's concerns, but walking away from these norms became costly – not extremely costly, but costly enough to be avoided in normal time. Risk-reduction measures have thus brought some direct forms of stability at both the operational level (military units), at the strategic level (exchange of notifications) and at the political level (direct communications) before formal arms-reduction treaties were able to deliver results in terms of stability.[90]

Some pre-existing patterns of deliberately risky behaviors were thus directly influenced by several of these measures. For instance, before the INCSEA agreement was signed, provocative air and naval maneuvers had been frequently used for coercive purposes; although both parties engaged in provocative acts, the Soviet navy, due to its relative weakness vis-à-vis the US navy, relied more on dangerous behavior such as risky air and naval maneuvers to keep US vessels far from the Soviet territories they were

89. On deconfliction efforts in Syria, see A. S. Weiss and N. Ng, "Collision Avoidance: The Lessons of U.S. and Russian Operations in Syria", Washington, D.C.: Carnegie Endowment for International Peace, March 20, 2019.
90. G. Bunn, *Arms Control by Committee: Managing Negotiations with the Russians*, Stanford, CA: Stanford University Press, 1992, pp. 230-231.

monitoring, to prevent them from tracking Soviet submarines, or even to monitor US SSBNs after they had left port or before they reached it.[91]

Importantly, the number of such incidents sharply dropped after the signature of the INCSEA agreement in 1972. Even though the following year saw a spike in tensions in the Mediterranean Sea during the October War, the established patterns of behavior held:

> Despite the influx of more than 150 warships into a relatively small body of water, and constant maneuvering to gain tactical advantage, there were few violations of the agreement signed in Moscow in May 1972. Despite the confrontation in the Mediterranean, the number of alleged violations of the accord dropped from twenty-four the first year to seven. [...] There were no collisions or instances of harassing close-quarter maneuvering.[92]

That the INCSEA agreement kept delivering its promises and channeling naval behaviors during the 1973 October War was all the more important since, at the same time, the US tried to deter the Soviet Union from directly intervening militarily in support of Arab countries, and chose to do so by placing US forces at a DEFCON 3 alert status. While the US Strategic Air Command increased its readiness by canceling routine training missions, testing command and control networks, dispersing some tankers and placing more B-52s in ground-runway alert, the benefits of avoiding and preventing incidents at sea between Soviet and US navies cannot be overstated.[93]

In addition to channeling competitive relations away from some of their most risky behaviors, risk-reduction measures have successfully created new habits of transparency and cooperation. Time-sensitive exchange of information to help discriminate relevant early-warning signals of an impending attack from routine exercises or test launches has been one benefit from measures such as pre-notifications of ballistic missile launches and of large-scale military exercises. Considering the shared concerns about the threat of a surprise attack in the nuclear age and the fact that ballistic missiles have long remained one of the most appropriate instruments to conduct such an attack due to their short flight time,[94] early notifications of

91. D. F. Winkler, *Cold War at Sea*, *op. cit.*, pp. 33-34.
92. *Ibid.*, p. 123.
93. S. D. Sagan, "Nuclear Alerts and Crisis Management" in: S. M. Lynn-Jones, S. E. Miller and S. Van Evera (eds.), *Nuclear Diplomacy and Crisis Management*, Cambridge, MA: The MIT Press, 1990, pp. 182-188.
94. Counterarguments stressing that the infrared signature of a ballistic missile during its boost phase makes it an inappropriate instrument for surprise attacks tend to overly focus on bilateral US-Russian strategic stability concerns. Most countries, including most nuclear weapons possessors, do not possess a network of space-based early-warning systems and thus cannot reliably detect ballistic missiles during their launch. For those nuclear weapons possessors lacking an early-

ballistic missile launches have the potential to contribute uniquely to strategic stability.

While initial measures taken as part of the 1971 Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War had limited effectiveness, they were rapidly strengthened by those included in the INCSEA agreement (cf. *infra*). The SALT II Treaty reinforced these agreements by introducing the obligation for "each party to notify the other well in advance of any multiple ICBM launches or of single ICBM launches which would extend beyond its national territory" by providing more details than was required under the INCSEA Agreement. Although SALT II never entered into force, the US notified all of its ICBM launches according to these newer guidelines from 1979 onwards,[95] and in May 1988 both parties signed an agreement under which all ICBM and SLBM launches would be notified, including their areas of launch and, with more details, their areas of planned impact.[96]

Interestingly, this agreement became a measure on which bilateral arms-control treaties came to rely, adding additional transparency and confidence-building measures (telemetry data exchanges, advanced notification of deployments, etc.) without replacing it.[97] When the New START treaty expires, between 2021 and 2026, and absent the entry into force of another agreement providing for additional transparency measures, the 1988 agreement will remain the only bilateral commitment requiring the advance notification of all US and Russian ICBMs and SLBMs.

Risk-reduction measures can help reduce strategic and operational ambiguity

Ambiguity surrounding the intentions of a potential adversary can be the result of both deliberate actions and involuntary/structural factors. Reducing ambiguity can contribute to strategic stability and global security if it decreases the probability that defensive intentions are interpreted as hostile or/and if it increases the probability that deliberate hostile acts are discouraged, or identified early enough and suppressed.

warning system, survivable second-strike capabilities and command, control and communications systems remain the only counter to the threat of surprise attack.

95. C. W. Weinberger, *Direct Communications Links and Other Measures to Enhance Stability*, *op. cit.*, p. 8.

96. Agreement on Notifications of Launches of Intercontinental Ballistic Missiles and Submarine-Launched Ballistic Missiles, Moscow, May 31, 1988.

97. See article VI(1) to the Notifications Protocol to the START Treaty and article IV(1) to the fourth part of the Protocol to the New START Treaty.

In the conduct of strategic policies, not every deliberate source of ambiguity is a source of instability. Ambiguity surrounding what constitutes each country's vital interest, for instance, is critical to deny potential aggressors the ability to identify how to maximize their gains without risking retaliation. As such, it helps to dissuade aggression and to curb interstate violence.[98] Ambiguity can, however, be a source of instability when it is meant to hide preparations for a surprise attack or a hostile initiative remaining below the threshold of armed aggression. A country planning to attack another will try to increase ambiguity surrounding its capabilities to mask the latter from detection, reducing the defender's ability to protect himself and to respond effectively and rapidly to the attack. This can be done in a number of ways, through the use of cover, concealment, denial and deception, which tend to increase the noise-to-signal ratio and make early-warning and attack assessment more difficult.[99] Relying on operational and strategic ambiguity has been at the heart of what has recently been labeled "gray area"/"gray zone" tactics and strategy.[100]

Risk-reduction measures were never meant to prevent a determined country from attacking another; rather, their goal has been to reduce the ambiguity surrounding the actions of a potentially hostile party.[101] By definition, no measure relying only on cooperation with a potential adversary can be enough to prevent an aggression by that very same adversary. *In practice, however, an important practical contribution of risk-reduction measures has been to help understand and clarify the intentions of a given country*.[102] Once norms of transparency, restraint and exchange of information are in place, a State's compliance or violation of these commitments becomes a powerful indicator of its intentions. By providing indications on how to respond to an adversary's ambiguous behavior – ranging from firmness (deterrence) to more appeasing options (de-escalation)[103] – these measures reduce the security dilemma. This point is often lost to critics of arms control who focus on the limits of these types

98. R. Jervis, *The Meaning of the Nuclear Revolution*, *op. cit.*, pp. 29-35.
99. On strategic deception, see D. C. Daniel and K. L. Herbig (eds.), *Strategic Military Deception*, New York, NY: Pergamon Press, 1981; M. I. Handel, *War, Strategy and Intelligence*, London: Frank Cass, 1989, pp. 310-454.
100. A recent RAND study provided a helpful definition of the gray zone as "an operational space between peace and war, involving coercive actions to change the status quo below a threshold that, in most cases, would prompt a conventional military response, often by blurring the line between military and nonmilitary actions and the attribution for events." See L. J. Morris *et al.*, *Gaining Competitive Advantage in the Gray Zone: Response Options for Coercive Aggression Below the Threshold of Major War*, Santa Monica, CA: RAND Corporation, 2019, p. 8.
101. S. Croft, *Strategies of Arms Control: A History and Typology*, *op. cit.*, p. 7.
102. S. Nunn and J. Warner, "A Practical Approach to Containing Nuclear Dangers" in: B. M. Blechman (ed.), *Preventing Nuclear War*, *op. cit.*, p. 2.
103. R. Jervis, *Perception and Misperception in International Politics*, *op. cit.*, pp. 58-113.

of measures while neglecting their potential value. They cannot substitute to deterrence, but nevertheless can contribute to crisis management, crisis prevention, or to the long-term stabilization of a political relation.[104]

Recently, this sort of value has been demonstrated by instruments such as the Vienna Document on Confidence- and Security-Building Measures when states parties to the agreement were under direct or indirect Russian attacks. In the 2008 Georgian war and particularly in 2014 in Ukraine, some measures from the Vienna Document such as inspection-team deployments could be triggered to provide evidence on Russian operations and attitude in Crimea and Eastern Ukraine, while several dozens of overflight missions made possible by the Open Skies Treaty were conducted over Ukrainian territory and southwestern Russia.[105] While Russia's refusal to submit to most inspections organized within the framework of the Vienna Document during the Ukraine crisis made it impossible to remove the cloak of opacity and deniability used to cover its operations, Moscow did not reap the full benefits at a diplomatic level due to its blatant obstruction of the confidence-building measures, which contributed to isolating itself.

By establishing standards of behavior that distinguish provocative from non-provocative behaviors on a commonly agreed basis, risk-reduction measures have thus helped to create a buffer zone separating malicious activities from those that may inadvertently appear malicious, opening the way for an appropriate and proportionate response.

The war in Syria also illustrates, albeit in a different way, how risk-reduction measures can help respond to ambiguous practices such as gray-area tactics, and the leverage they can provide to states parties to these agreements confronted with such tactics. On February 7, 2018, near Deir ez-Zor, a small group of US Special Forces and allied Syrian rebels were threatened by a force of 500 troops supported by battle tanks and artillery, early identified as both the Syrian military and a paramilitary Russian group sometimes referred to as the "Wagner Group". In practical terms, the US used the existing channels of communication in place with Russia to obtain clarification from "the Russian high command in Syria [that] it was not their people". Once the Russian high command had made it clear it had nothing to do with the "Wagner Group", US forces were authorized to provide a firm response to the attack without running the risk of an escalatory response

104. J. S. Nye, "Nuclear Risk Reduction Measures and U.S.-Soviet Relations" in: B. M. Blechman (ed.), *Preventing Nuclear War*, *op. cit.*, pp. 12ff.
105. J. Engvall, *OSCE and Military Confidence-Building in Conflicts: Lessons from Georgia and Ukraine*, Stockholm: FOI, March 2019, pp. 36-41.

from Russia.[106] Thus, in what could have been a concerning scenario pitting US soldiers and combatants with close links to Moscow directly against each other, risk-reduction measures helped prevent a local skirmish from escalating into a major crisis between two nuclear powers by forcing Moscow to lift the ambiguity surrounding its use of paramilitary forces.

Finally, when they are complied with long enough to allow for the emergence of a norm of behavior, risk reduction measures can establish thresholds whose violation becomes more significant – and thus potentially costly – over time. If, after a record of compliance, an action prohibited by an agreement is conducted nonetheless, or if a transparency measure ceases being implemented, the meaning of such actions is much more significant since it can be assumed to be intentional. For instance, the signature of the agreement on the prevention of incidents at sea did not put an end to all provocative behaviors at sea. However, once the INCSEA agreement had been signed and put in place, and once national regulations reflected the new rules, when a provocative behavior happened at sea between the United States and USSR, (1) there was a bilateral review process in place to file complaints and review detailed evidence of the dangerous actions that could have happened, and (2) it was easier to interpret those actions. Whether the act is a show of force to ramp up political pressure or to signal discontent, it can be assumed not to be the product of a misunderstanding or of an incident, and can thus be met by appropriate responses.[107]

Bilateral measures can lay the foundations for global effects

There have been multiple examples of bilateral confidence-building agreements that later on were replicated in other bilateral relationships, or in multinational regimes.

INCSEA started on a bilateral level between the US and the USSR, but the number of agreements has grown, particularly at the end of the Cold War. The success of these risk-reduction measures created a precedent that was emulated in other bilateral relations: with the United Kingdom (1986), West Germany (1988), France (1989), Italy (1989), Spain (1990), the Netherlands (1990), as well as Canada, Greece, Portugal and Turkey.[108]

106. T. Gibbons-Neff, "How a 4-Hour Battle Between Russian Mercenaries and U.S. Commandos Unfolded in Syria", *The New York Times*, May 24, 2018, available at: www.nytimes.com.
107. S. M. Lynn-Jones, "A Quiet Success for Arms Control: Preventing Incidents at Sea", *op. cit.*; D. F. Winkler, *Cold War at Sea*, *op. cit.*
108. *Bilateral Military Agreements between NATO Member States and the Soviet Union on the Prevention of Incidents*, European Leadership Network, undated, available at: www.europeanleadershipnetwork.org.

While this diffusion of the principles of the INCSEA agreement happened mostly during the second half of the 1980s, when political relations between Western capitals and Moscow were already improving, they have remained in place and continued to deliver stabilizing effects since the end of the Cold War, even when political relations soured. This precedent had effects beyond the bilateral relations with the Soviet/Russian navy: an INCSEA agreement was signed in November 1990 between West Germany and Poland, while an agreement similar to the INCSEA agreement was put in place between the US and China in 1998.[109]

Other examples are provided by the issue of pre-launch notifications of ballistic missiles. At the end of the Cold War, the Iran-Iraq war and operation *Desert Storm* seemed to herald an era of greater strategic instability at the regional levels due to the proliferation of ballistic missiles in a growing number of countries. The *Hague Code of Conduct Against the Proliferation of Ballistic Missiles* (HCOC) was among the instruments put in place to tackle that challenge. It includes a requirement that all states party to the code of conduct provide pre-launch notifications of both ballistic missiles and space-launch vehicle launches[110]. A total of 140 states have now joined the HCOC and received notifications from other members, contributing in a unique way to stabilize relations. At a bilateral level, the example formed by the US-Soviet/Russian series of agreements on the pre-notification of ballistic missile launches led India and Pakistan to adopt in 2005 an agreement with similar measures. The agreement has been tailored to the requirements of the South Asian subcontinent, and thus applies to all types of ballistic missiles, whatever their ranges, and includes constraints on the launch sites, trajectories and planned impact areas, so that they stay away from each other's territories.[111]

Risk-reduction measures can be resilient to tensions

CBMs have been there for decades, although they have been much less visible than formal, treaty-based arms control. While some risk-reduction measures have been part of formal treaties, most of them have taken the form of political commitments rather than legally binding agreements. The downside to this lower visibility has been that the constraints placed on

109. D. F. Winkler, *Cold War at Sea*, *op. cit.*, pp. 167-172.
110. On the HCoC, see "What is HCoC", HCoC website, February 2020, available at: www.hcoc.at; and the HCoC website, available at: www.nonproliferation.eu.
111. Agreement between the Republic of India and the Islamic Republic of Pakistan on pre-notification of flight-testing of ballistic missiles, Islamabad, 2005, available at: http://mea.gov.in.

each party's ability to inflict harm on the other are more easily reversible in the short term.

The upside to this, however, is that this low visibility has spared some of those measures the fate of treaty-based arms control, which has not only been more and more criticized as an instrument of cooperative security, but has become deeply polarizing on political and ideological grounds. In the US, those risk-reduction measures have remained largely under the control of the executive branch and have been less affected by Congress's rejection of constraints on American power than formal treaties that the Senate has to ratify. This nonbinding character could have made these measures short-lived, but most have remained active and implemented – although compliance issues did unsurprisingly appear for some of them, such as the 1975 Helsinki Final Act or the Vienna Document, mostly in relation to local conflict disconnected from relations between nuclear weapons possessors.[112]

Like other arms-control measures, risk-reduction measures have been criticized for being at best naïve and at worst dangerous in creating misguided expectations of cooperative behavior with unfaithful adversaries that could thus be better able to cheat and deceive their faithful counterpart.[113] Efforts to promote transparency and to establish new channels of communications for crisis prevention and management were met with skepticism from critics who assumed that those very channels such as the DCL would be used for deceptive purposes.[114] The track record, however, has provided no evidence of such attempts to deceive. On the contrary, the uses of the DCL have proven the value of this channel of communications to clarify intent and share information in times of crisis. Not only has there been no public report of unfaithful use of the DCL, either before or after the Cold War ended, but on the contrary the DCL seems to have helped to create personal trust between US and Soviet leaders.

Thirty years ago, Colin Gray criticized arms control for being trapped within a paradox: as an instrument meant to strengthen security, arms control would presumably not be useful whenever it is achievable (when the state of political relations allows for an agreement) and not possible when it might be useful – when there is deep mistrust and tensions.[115] The paradox, however, is only true at first sight, and disappears when one takes a longer-term view to assess the effectiveness of risk-reduction measures. Tensions

112. Z. Lachowski, *Confidence- and Security-Building Measures in the New Europe*, SIPRI Research Report, No. 18, Oxford: Oxford University Press, 2004, pp. 85-96.
113. J. E. Hinds, "The Limits of Confidence" in: J. Borawski (ed.), *Avoiding War in the Nuclear Age*, *op. cit.*, *pp.* 184-198.
114. S. K. Horn, "The Hotline", in: J. Borawski (ed.), *Avoiding War in the Nuclear Age*, *op. cit.*, p. 43.
115. C. S. Gray, *House of Cards. Why Arms Control Must Fail*, Ithaca, NY: Cornell University Press, 1992, pp. 17-18.

will continue to rise and fall, but what matters is that the instruments have remained in place and kept on delivering their effects – arguably limited – on stability, including during crises. For instance, the patterns of responsible behavior developed after the signature of the INCSEA agreement have generally held during times of tensions.[116] More recently and importantly, the risk-reduction measures included in the New START treaty and in the 1988 agreement on ballistic missile launch notification have been faithfully implemented by both parties – and even during the crisis in Ukraine, during which the Russian strategic rocket forces conducted no less than six strategic ballistic missile launches[117].

The fact that state parties to an agreement continue to take risks and to exert coercive pressure on each other during crises despite the existence of the agreement does not mean that the latter has failed. In fact it continued to deliver its effects throughout the crises, lowering the chances that inadvertent escalation would happen. Risk-reduction measures can help mitigate the most wide-ranging and dramatic consequences of the security dilemma but cannot be expected to make instability at the lower level of conflict wholly disappear.

Political and operational resilience over time is thus very valuable as it only takes a few years for political relations to take sudden negative turns. Even if risk-reduction measures such as CBMs can appear of remote utility when concluded during a period of relatively low tensions, their ultimate value and importance can only appear later on, over the longer term. One cannot anticipate how the record of compliance with CBMs will look in the future, but the past decades provide evidence that nuclear weapons possessors have benefited from the effects of these agreements and that these measures could still influence their behavior when it matters most: during major international crises.

116. D. F. Winkler, *Cold War at Sea*, *op. cit.*, pp. 140-141.

117. Russia launched two SLBMs and four ICBMs between March and May 2014. The two SLBMs were fired on the same day as a SS-25 *Topol* ICBM. See entries in Pavel Podvig's blog: "Another new warhead test in a Topol launch from Kapustin Yar", March 4, 2014; "RS-24 Yars launched from Plesetsk", April 14, 2014; "Multiple missile launches during a command and control exercise", May 8, 2014; "Topol-E launched from Kapustin Yar", May 20, 2014, all available at http://russianforces.org/blog/.

Conclusion: Risk Reduction and Restraint in the 21st Century

As we craft the way ahead, we need to be mindful of what a strategic approach to risk reduction entails, and of the insights from the past. Maintaining a broad view of what the arms-control endeavor is fundamentally about matters crucially, particularly so as the treaties that have been seen as the best reflection of this effort have been increasingly criticized and questioned. As the treaty-based bilateral arms-control architecture follows a downward spiral, it is worth recalling that those legal instruments, as valuable and symbolic as they have been, are not the only valuable elements of the security architecture inherited from both the late Cold War and the 1990s: there have been other examples of negotiated restraint on strategic and operational practices and capabilities that have provided security benefits and stability in times of crisis, including during Cold War crises or in the most recent sequence marked by increased geopolitical tensions.

The current phase of renewed strategic competition is a painful reminder that not every threat can be handled through a cooperative approach, and that not all risks of war result from misunderstanding. Some countries have genuine revisionist strategic aims and most states look for ways to weaken a rival, to make it submit, or to extort concessions. In these cases, the ability of risk-reduction measures to prevent escalation and war will remain insufficient, and will have to be complemented by a credible policy of deterrence, whose purpose will continue to be to discourage strategic attacks and prevent a slide toward disinhibited strategies relying centrally on the use of military force. *Nevertheless, one should not infer from this that risk reduction cannot serve any purpose in a context of strategic competition. Strategic risk-reduction measures are all the more critical in a context of hostility, as this is precisely when, because of mutual hostility and increases in the operational activity of armed forces, the risks associated with misinterpretation and miscalculation are the greatest.* Even though major powers have tended not to acknowledge it openly in recent years, they still have a shared interest in avoiding worst outcomes, in particular nuclear war. Existing and future strategic risk-reduction

measures must continue to channel strategic competition away from its most dangerous paths.

Although the scope of this report precludes an exhaustive analysis of strategic risk-reduction measures that could help tackle current and expected threats to strategic stability, the insights drawn from past risk-reduction experience between nuclear weapons possessors suggest at least two complementary streams of efforts that ought to be considered.

- **Deepen the discussions among the P5 on nuclear policies and risks, and start developing a 21st century regime of strategic restraint.** An important way for P5 countries to demonstrate their willingness to reduce the risks of nuclear use should be to deepen discussions on nuclear doctrines and postures by tackling topics such as nuclear signaling and sources of ambiguity; restraint and criteria for sufficiency in nuclear-force development (weapons, means of delivery and platforms; R&D, including nuclear weapons testing; procurement; deployment); dual-capable systems and platforms; and non-nuclear offensive and defensive concerns and the future of the offense-defense relationship.[118] This could serve as a basis for a broadened discussion between the established nuclear weapons possessors focused on how the principle of restraint could apply to their interactions and translate into practice during both peace time and crisis time,[119] including in new or transformed domains (cyber and space), in terms of doctrines and declaratory policies, as well as weapons development and testing.
- **Make confidence-building measures inherited from the Cold War even more relevant to today's challenges**. Several bilateral or regional risk-reduction mechanisms, such as a dozen bilateral INCSEA agreements, the Vienna Document on confidence- and security-building measures, and the bilateral agreement on the Prevention of Dangerous Military Activities, were drafted up to five decades ago based on what was then the state of technology, and where the US and the Soviet Union were in closest proximity. They still have a role to play, however, to reduce military ambiguity and allow for denser communication channels and information exchange. Efforts to adapt these agreements could, for instance, lead to the inclusion of more

118. Different but comparable recommendations can be found in S. Shetty and H. Williams, *The P5 Process: Opportunities for Success in the NPT Review Conference*, London: King's College London/European Leadership Network, June 2020, pp. 9-10.

119. Lew Dunn's "code of nuclear responsibilities" provides many excellent illustrations of what the nuclear dimension of this regime of restraint could entail. See L. A. Dunn, "Reducing Global Nuclear Risk: A Strategy for Cooperative Engagement" in: B. Roberts (ed.), *Major Power Rivalry and Nuclear Risk Reduction: Perspectives from Russia, China, and the United States*, Livermore, CA: Center for Global Security Research – Lawrence Livermore National Laboratory, May 2020, pp. 32-34.

modern types of capabilities and technologies (long-range surface-to-air missiles, radar illumination, electronic warfare, conventional prompt strike capabilities, etc.) that are now of concern to parties. Such efforts could more generally lead to increases in the level of transparency offered by a given agreement, for instance by updating the Vienna Document on CBMs.[120] An even higher priority would be to craft similar risk-reduction measures to cover regions where nuclear risks are on the rise and in which the security architecture has remained insufficiently developed, in particular in the Western Pacific and Indian Oceans. Considering the increasing number of incidents between surface ships in close proximity to the Chinese coast and the development of the Indian and Pakistani navies, including in the nuclear domain, starting discussions on a potential INCSEA regime in Eastern and South Asia would certainly contribute to reducing risks of incidents leading to escalation between nuclear weapons possessors. Similarly, considering the number of testing activities conducted by China during recent years in the field of ballistic missiles, having Beijing join the Hague Code of Conduct and provide pre-launch notification of all its ballistic missile tests, whatever their range, while receiving those from all other participating countries, would particularly contribute to strategic stability.

The responsibility of nuclear weapons possessors is to acknowledge the fact that, as long as these weapons exist, preventing their actual use will remain a shared major interest and should remain a shared fundamental objective of their security policies. One of the most concerning aspects of the current period is that this perception of shared interest in avoiding worst outcomes has been less and less visible in the views articulated by political leaders of several nuclear weapons possessors. Risk reduction efforts and measures have a crucial role to play in order to prevent state behaviors and strategies from drifting further away toward ever more opaque and competitive postures and policies that undermine strategic stability.

120. On the specific needs to update the CBMs in Europe, see for instance the suggestions in C. Brustlein, "The Erosion of Strategic Stability and the Future of Arms Control in Europe", *op. cit.*; S. Charap *et al.*, *A New Approach to Conventional Arms Control in Europe: Addressing the Security Challenges of the 21st Century*, Santa Monica, CA: RAND Corporation, 2020.

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