

NUCLEAR RISK REDUCTION:

THE STATE OF IDEAS



UNIDIR

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List of acronyms and abbreviations

C3I	command, control, communications and intelligence
IRBM	intermediate-range ballistic missile
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
WMD	weapons of mass destruction

Key takeaways

- Differing perspectives on nuclear weapon risk reduction reflect varied constituencies, priorities, and strategic cultures.
- A comprehensive and considered approach to risk reduction can help to identify areas of common interest as a basis for joint action.
- Risk reduction activity during the Cold War provides a useful blueprint but requires re-examination in light of the modern nuclear landscape and evolving security environment.
- Risk reduction measures should be considered with respect to their applicability and feasibility in particular use contexts, including regional.

1 Context

In recent years, calls to address the range of risks that could lead to the use of nuclear weapons have become more frequent and more urgently expressed. Nuclear weapon risk reduction has been raised in several multilateral forums including the 2018 session of the United Nations Disarmament Commission, the 2018 Preparatory Committee for the 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), and the Secretary-General's Agenda for Disarmament. Discussions in these settings reflect concerns with the deteriorating strategic environment, the fear of greater potential for accidents or miscalculation involving nuclear weapons in crisis situations, and new technological developments that create ambiguity about the circumstances in which nuclear weapons might be used.

2 What is risk reduction?

Nuclear risk reduction is about decreasing the possibility that nuclear weapons are used, whether deliberately or inadvertently. The overall pool of potential measures that could contribute to such risk reduction is large, including steps to improve the safety and security of nuclear weapons, lessen the risk of accidents, lower the possibility for miscalculation in crisis, and prevent terrorists from obtaining nuclear materials. Yet broad-based support for the idea of reducing to an absolute minimum nuclear risk has not—to date—translated into general agreement on the means by which these and other objectives might be pursued. Each nuclear possessor has its own policies and practices, by and large, and their level of transparency on matters of risk is both variable and limited. Meanwhile, a number of individual States and experts have put forth proposals that tackle particular aspects of risk. But such proposals are not uncontested. It is clear that in discussions of nuclear risk, what constitutes risk reduction in the eyes of some may for others increase risk by upending the credibility of nuclear deterrence, threatening strategic stability, or creating new forms of unhelpful nuclear ambiguity.

Differing national security perspectives, each driven by varied constituencies, priorities, and strategic cultures, lead to varied interpretations of nuclear weapon risk and its reduction.¹ Even if ‘risk’ can be understood as a function of probability and consequence, which measures are relevant, let alone feasible, contain an element of subjectivity. As such, there is most likely no singular risk reduction path. Nor does objective assessment that an absolute practical minimum of nuclear risk has been reached (short of elimination of all nuclear weapons, which seems far off) seem straightforward. Nevertheless, it means that, in view of the wide spectrum of possibilities, a greater degree of precision and systematization in conversations on risk reduction would be helpful. A first step is to put stakeholders on the same page regarding the state of existing ideas and proposals. This can make it easier to identify possible areas of common interest, facilitating the development of practical, feasible measures.

¹ For more on risk, see J. Borrie, T. Caughley and W. Wan (eds), *Understanding Nuclear Weapon Risks*, UNIDIR, 2017, <http://www.unidir.org/files/publications/pdfs/understanding-nuclear-weapon-risks-en-676.pdf>.

3 Ideas in risk reduction

As part of its ongoing research on reducing the risk of nuclear weapon use, UNIDIR engaged in a mapping and scoping exercise of existing ideas in and around risk reduction. These policy proposals and recommendations stem from disparate sources across the academic, research, and policymaking communities. The findings have been condensed and summarized in table 1. Some initial observations follow.

Risk reduction is not a theoretical exercise, as there exists a long-standing foundation for such activities, including against a difficult geopolitical landscape. Nuclear risk reduction was a “central preoccupation” between the United States and the Soviet Union during the Cold War, and more recently has been a foundation for some confidence-building measures in South Asia.² Indeed, many proposals to date derive from or engage directly with these and other existing contexts. They include calls for nuclear-armed States to reaffirm the 1987 joint declaration from US President Ronald Reagan and his Soviet counterpart Mikhail Gorbachev that “nuclear war cannot be won and must never be fought”, or to more strongly implement and enhance diplomatic and military hotlines (as established between Moscow and Washington in 1963, or between Islamabad and New Delhi in 1971).³

At the same time, recognizing today’s complex security environment, scholars and experts are increasingly looking beyond the bilateral, Cold War-based paradigm of risk reduction. This is reflected in proposals that call for an extension of existing mechanisms both in terms of membership and scope. In fact, a recurring set of motivations behind existing risk-reduction ideas involves enhancing mutual understandings across all nuclear-armed States.⁴ There exist calls for regularized dialogues on nuclear doctrines, information-exchange on capabilities, and principles and codes of conduct around nuclear weapons.⁵ And there is some evidence to support the notion this is being taken up, for instance in institutionalized dialogue between the five NPT nuclear-weapon States over the last decade. While analysts readily acknowledge that parties may be unable to overcome fundamental divisions, more accurate and nuanced readings of one another might contribute to increased empathy—or at least intellectual understanding—alleviating broader tensions. Such a

² M. Krepon (ed.), “Nuclear Risk Reduction: Is Cold War Experience Applicable to Southern Asia?”, in *Nuclear Risk Reduction in South Asia*, 2004, p. 8.

³ H. Miall, “Exploring New Approaches to Arms Control in the 21st Century: Building Lessons from the Intermediate-Range Nuclear Forces (INF) Treaty and Presidential Nuclear Initiatives (PNIs)”, *Policy Brief No. 30*, Toda Peace Institute, November 2018, http://www.toda.org/files/policy_briefs/T-PB30_Hugh%20Miall_INF%20Workshop%20Report.pdf; Global Zero Nuclear Crisis Group, *Urgent Steps to De-Escalate Nuclear Flashpoints*, June 2017, https://www.globalzero.org/wp-content/uploads/2018/10/NCG_Urgent-Steps_June-2017.pdf.

⁴ L.A. Dunn, “The Strategic Elimination of Nuclear Weapons: An Alternative Global Agenda for Nuclear Disarmament”, *The Nonproliferation Review*, vol. 24, no. 5-6, 2017; Group of Eminent Persons for Substantive Advancement of Nuclear Disarmament, *Recommendations for the 2020 Review Process for the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*, March 2019, <https://www.mofa.go.jp/files/000403715.pdf>.

⁵ L. Bin, “Differences Between Chinese and U.S. Nuclear Thinking and Their Origins”, in L. Bin and T. Zhao (eds), *Understanding Chinese Nuclear Thinking*, Carnegie Endowment for International Peace, 2016; R. Einhorn and W.P.S. Sidhu, “The Strategic Chain: Linking Pakistan, India, China, and the United States”, *Arms Control and Non-Proliferation Series Paper 14*, Brookings, March 2017, https://www.brookings.edu/wp-content/uploads/2017/03/acnpi_201703_strategic_chain.pdf; J. Anderson, “Negotiating a Nuclear ‘Code of Conduct’”, *The Project on Nuclear Issues*, 17 January 2018, <https://nuclearnetwork.csis.org/negotiating-nuclear-code-conduct>.

Table 1: Summary of compiled ideas, proposals, and recommendations to reduce the risk of nuclear weapon use

CATEGORY	RISK REDUCTION ACTIVITIES	SAMPLE PROPOSALS
Doctrine	<ul style="list-style-type: none"> Commitment of non-use or threat of use Lessened role of nuclear weapons in security policies Declaratory policies on avoiding nuclear use Ban on classes of nuclear weapons or delivery systems Extension of negative security assurances Establish principles around nuclear weapons possession 	<ul style="list-style-type: none"> - Reaffirm Reagan-Gorbachev statement; convention on prohibition of use - Scaling back of modernization programmes; deterrence alternatives - “No first use”, “sole purpose (is to deter/defend)”, “(weapon of) last resort” - Lower-yield, dual-capable, e.g. nuclear-armed cruise missiles, IRBMs - Binding legal agreement, eliminate caveats against WMD use - Develop common lexicon, code of conduct or on nuclear responsibility
Strategy	<ul style="list-style-type: none"> Protection of nuclear-related technological systems (C3I) Agreement not to attack nuclear-related facilities Reductions in numbers of deployed weapons Restrictions on the nature of deployment Changes to deployment patterns and alert status 	<ul style="list-style-type: none"> - Agreement on non-cyber interference, respect space assets (e.g. non-attack) - Military and/or civilian, with regular list exchange (e.g. South Asia) - Withdrawal, put into central storage, or disassemble - In geography (submarine proximity) and type of system (mobile launchers) - Removal from prompt-launch status
Operations	<ul style="list-style-type: none"> Strengthen human assessment and decision-making Physical separation of nuclear weapons Mechanisms to delay, disrupt, or deactivate launch Enhance safety and security of weapons and materials Address provocative military practices Pre-notification of actions susceptible to misinterpretation 	<ul style="list-style-type: none"> - ‘Dual phenomenology’ to verify or refute early warning data - Nuclear from conventional; de-mating from delivery vehicles - Silo barriers, safing switches, de-targeting, redundancies - Global materials security system, interdiction of illicit transfers - Reconnaissance flights, missile flight tests, buzzing practices - Of missile tests, military exercises, deployment
Transparency	<ul style="list-style-type: none"> High-level dialogues on pertinent issues Information exchange on pertinent issues Communication in crisis situations Notification of nuclear-related incidents Systematized risk assessment and/or analysis 	<ul style="list-style-type: none"> - Strategic stability, nuclear risk/threats, nuclear security - Doctrines, capabilities, exercises, weapons hosted - Hotlines, early warning centers, transparency of operations - Accidents at sea, theft or loss of control of weapons or materials, cyberattack - Database of past incidents, sharing of best practices

foundation of knowledge also reduces the possibility for nuclear use linked to miscalculation and misperception.

Concerns about inadvertent use of nuclear weapons have given rise to another prominent set of ideas, linked to the impact (real and potential) of technological developments in the nuclear sphere. For instance, there are calls to ban or limit the deployment of specific classes of nuclear weapons perceived as more usable due to their effectiveness and operational flexibility, and delivery vehicles that can create confusion as to their nuclear or non-nuclear payloads.⁶ Other proposals call for enhancing the transparency around these particular capabilities, including through pre-notification procedures for missile tests.⁷ There are numerous ideas in and around the systems that govern the operation and maintenance of nuclear weapons as well.⁸ Proposals here range from protecting nuclear-related systems from cyber interference (for instance through national preventive means, or multilateral agreement of non-attack on such systems) to creating multiple redundancies that can protect or enhance human decision makers' access to accurate information, to regularizing dialogue on such issues.⁹

As hinted by the above, the depth of existing ideas in nuclear weapon risk reduction can be overwhelming. Moreover, there can be considerable variation in concepts or proposals such as “no first use” or “de-alerting” in terms of the precise form they may take or how they would be pursued—even if they are lumped together in shorthand.¹⁰ And while a basic categorization of measure type (as in table 1) provides a means of organization, in practice risk reduction undertakings of different kinds would likely be intertwined. For instance, an operational ‘fix’ such as activating safing switches to delay any potential launch of a nuclear missile would not be implemented in isolation from strategic or doctrinal considerations. Similarly, the establishment of a code of nuclear responsibility would likely have ramifications at the operational level. There exist limitations to examining individual risk reduction ideas on their own.

To this end, a functional approach may help to bridge the discussion and more effectively situate existing risk-reduction ideas. One way to benchmark proposals of all types could be to consider the extent to which they contribute to the following aims:

- increasing the flow of information between nuclear-armed adversaries, including in times of crisis;

⁶ A. Weber, “Nuclear-Armed Cruise Missiles Should be Banned”, *Policy Brief No. 12*, Toda Peace Institute, May 2018, http://toda.org/files/policy_briefs/T-PB-12_Weber_Cruise-missiles.pdf; P. Podvig and J. Serrat, *Lock Them Up: Zero-Deployed Non-Strategic Nuclear Weapons in Europe*, UNIDIR, 2017, <http://unidir.org/files/publications/pdfs/lock-them-up-zero-deployed-non-strategic-nuclear-weapons-in-europeen-675.pdf>.

⁷ R. Berls Jr. and L. Ratz, “Rising Nuclear Dangers: Steps to Reduce Risks in the Euro-Atlantic Region”, Nuclear Threat Initiative, 2016, https://media.nti.org/documents/NTI_Rising_Nuclear_Dangers_Paper_FINAL_12-5-16.pdf.

⁸ 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, 2018.

⁹ S. van der Meer, “Reducing Nuclear Weapons Risks: A Menu of 11 Policy Options”, Clingendael: Netherlands Institute of International Relations, June 2018, https://www.clingendael.org/sites/default/files/2018-06/PB_Reducing_nuclear_weapons_risks.pdf; P.O. Stoutland and S. Pitts-Kiefer, “Nuclear Weapons in the New Cyber Age”, Report of the Cyber-Nuclear Weapons Study Group, Nuclear Threat Initiative, September 2018, https://media.nti.org/documents/Cyber_report_finalsmall.pdf.

¹⁰ Among others, see Global Zero, *Global Zero Commission on Nuclear Risk Reduction: De-Alerting and Stabilizing the World's Nuclear Force Postures*, April 2015, <https://www.globalzero.org/wp-content/uploads/2018/10/Global-Zero-Commission-on-Nuclear-Risk-Reduction-Full-Report.pdf>; M. Sethi, “Towards a Nuclear Restraint Regime: From a Normative Ban Treaty to a Substantive Agenda”, *Policy Brief No. 8*, Toda Peace Institute, March 2018, http://toda.org/files/policy_briefs/T-PB_8-Sethi_NPT_&_Ban_Treaty.pdf; H.M. Kristensen and M. McKenzie, *Reducing Alert Rates of Nuclear Weapons*, UNIDIR, 2012, <http://www.unidir.org/files/publications/pdfs/reducing-alert-rates-of-nuclear-weapons-400.pdf>.

- extending the decision-making fuse and allowing for disruption of or stand-down from use;
- establishing clarity in intention;
- practicing self-restraint in behavior;
- strengthening the exceptional nature of nuclear weapons and thus the norm against their use;
- ensuring long-term engagement on issues linked to nuclear risk.

This is not an exhaustive list of objectives. And considering the larger context—including possible unintended consequences—is also required.

4 Reframing risk reduction

Thirty years after the Cold War ended, nuclear weapons are still part of the deterrence calculations of East and West. As suggested above, however, there is also the risk of nuclear use in newer scenarios with their own conditions. These situations include the Korean peninsula, South Asia, and even the Middle East. It means that it would pay for the policy community to think regionally in terms of the applicability and feasibility of risk-reduction measures. UNIDIR's mapping of the state of ideas on nuclear weapon risk reduction to date indicates that although a wide array of proposals exist, this point is not yet fully acknowledged in the literature. Certainly, nuclear experts recognize the implications of particular nuclear dyads (or triads) and regional scenarios. But the applicability and feasibility of nuclear risk-reduction measures in differing situations could benefit from fuller, more systematic treatment, one that reframes the topic around the pathways to potential nuclear use.¹¹

On that basis, risk reduction 'baskets' constituted of varying and ideally mutually reinforcing elements could be designed to narrow the possibility of particular nuclear risk pathways, and lessen their number, thus reducing risk of use overall. Identifying and analysing those pathways—and suitable risk reduction baskets—is what UNIDIR will work to do in terms of its upcoming research.

¹¹ Echoing the thoughts of Joseph Nye, who in examining US–Soviet risk reduction three decades ago, observed that “efforts to reduce the risk of nuclear war must start with an understanding of the likely paths by which a nuclear war might begin”; see J.S. Nye Jr., “U.S.–Soviet Relations and Nuclear-Risk Reduction”, *Political Science Quarterly*, vol. 99, no. 3, August 1984, p. 404.

This paper—prepared on the occasion of a side event at the 2019 Preparatory Committee for the 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons—presents preliminary findings of UNIDIR’s ongoing work on reducing the risk of nuclear weapon use. It shares general observations from UNIDIR’s mapping and scoping of existing risk-reduction ideas, with a view to facilitating the development of practical, feasible, and contextually appropriate measures to reduce risk.



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