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The false promise of nuclear risk reduction

BENOÎT PELOPIDAS AND KJØLV EGELAND*

In a context of intensifying great power competition and deep divergences of view between nuclear and non-nuclear powers on the urgency of nuclear abolition, ‘nuclear risk reduction’ has gained renewed attention as a pragmatic framework for managing and progressively reducing nuclear dangers.¹ The pitch is simple. With more fundamental policy changes either undesirable or out of reach, government officials, parliamentarians and civil society actors invested in nuclear arms control and disarmament should focus their efforts on humanity’s ‘shared interest’ in curtailing the risk of nuclear weapon use.² This means collectively identifying, analysing and sequestering so-called nuclear risk scenarios.³ In the

* We are grateful to Martin Hellman, Carmen Wunderlich, Martin Senn, Harald Müller, William Walker, Alex Bollfrass, Debak Das, Nick Ritchie, Matthew Evangelista and the journal’s anonymous reviewers for helpful comments and suggestions. All errors are ours alone. This work was supported by the European Research Council under the European Union’s Horizon 2020 research and innovation programme (Grant Agreement No. 759707, ‘NUCLEAR’).

¹ See, for example, Brad Roberts, ed., *Major power rivalry and nuclear risk reduction: perspectives from Russia, China, and the United States* (Livermore, CA: Lawrence Livermore National Laboratory, 2020); Brad Roberts, ‘On adapting nuclear deterrence to reduce nuclear risk’, *Dædalus* 149: 2, 2020, pp. 69–83, https://doi.org/10.1162/DAED_a_01790; Wilfred Wan, ed., *Nuclear risk reduction: closing pathways to use* (Geneva: United Nations Institute for Disarmament Research, 2020), <https://unidir.org/publication/nuclear-risk-reduction-closing-pathways-to-use>; Wilfred Wan, *Nuclear risk reduction: looking back, moving forward, and the role of NATO* (Rome: Istituto Affari Internazionali, 2020), <https://www.iai.it/en/publicazioni/nuclear-risk-reduction-looking-back-moving-forward-and-role-nato>; Petr Topychkanov, ‘Taking forward the dialogue on nuclear risk reduction’, *Journal for Peace and Nuclear Disarmament* 4: 1, 2021, pp. 157–62, <https://doi.org/10.1080/25751654.2021.1923885>; Nuclear Threat Initiative, ‘Reducing nuclear risks’, undated, <https://www.nti.org/area/nuclear/reducing-nuclear-weapon-risks>; Sylvia Mishra, ‘The nuclear risk reduction approach: a useful path forward for crisis mitigation’, Asia-Pacific Leadership Network, 27 Jan. 2023, <https://www.apln.network/analysis/commentaries/the-nuclear-risk-reduction-approach-a-useful-path-forward-for-crisis-mitigation-and-building-bridges>; John Gower and Christine Parthemore, *A practical strategy for nuclear risk reduction and disarmament* (Washington DC: Council on Strategic Risks, 2021), <https://councilonstrategicrisks.org/2021/04/19/briefer-a-practical-strategy-for-nuclear-risk-reduction-and-disarmament-fulfilling-the-code-of-nuclear-responsibility>. Some analysts adopt a more inclusive lens, preferring the term ‘strategic’ risk reduction. See, for example, Corentin Brustlein, *Strategic risk reduction between nuclear-weapons possessors* (Paris: Institut français des relations internationales, 2021), <https://www.ifri.org/en/publications/etudes-de-lifri/prolifération-papiers/strategic-risk-reduction-between-nuclear-weapons>; Rishi Paul, *Advancing strategic risk reduction in Europe* (London: The British American Security Information Council, 2020), <https://basicint.org/wp-content/uploads/2020/06/European-Strategies-for-Strategic-Risk-Reduction-WEB.pdf>. (Unless otherwise noted at point of citation, all URLs cited in this article were accessible on 6 Nov. 2023.)

² Lina-Marieke Hilgert, Angela Kane and Anastasia Malygina, ‘The TPNW and the NPT’, Deep Cuts Issue Brief 15, Jan. 2021, https://deepcuts.org/files/pdf/Deep_Cuts_Issue_Brief_15-TPNW_and_NPT.pdf.

³ Wan, ed., *Nuclear risk reduction: closing pathways to use*.

words of Gareth Evans, a former Australian Foreign Minister and co-chair of the International Commission on Nuclear Non-Proliferation and Disarmament,

In an environment where the achievement of ‘Global Zero’ remains manifestly out of reach for the indefinitely foreseeable future, it makes sense for those advocating a nuclear-weapon-free world not to make the best the enemy of the good. Rather, we should focus on nuclear risk reduction, finding common ground with those policymakers who may be uncomfortable abandoning what they still see as the ultimate deterrent and security guarantor, but nonetheless understand all the risks involved with nuclear weapons possession and want to minimise them.⁴

Centring the nuclear policy conversation on the risk of use, so goes the argument, promises to reduce political polarization between nuclear and non-nuclear powers, increase trust between states, and, most fundamentally, help manage or gradually reduce nuclear dangers⁵—perhaps even to the point of a ‘permanent escape’ from the nuclear predicament.⁶ While support for nuclear risk reduction does not necessarily imply support for the goal of nuclear abolition, the risk reduction focus is frequently promoted in the name of total disarmament. According to US Deputy Under Secretary of State Alexandra Bell, ‘we all share the goal of the peace and security of a world without nuclear weapons. Risk reduction is one of the ways that we get there.’ The conversation on risk reduction must therefore be broad, inclusive and open-ended, as ‘all the good ideas are not going to come out of Washington, Moscow, Beijing, Paris, London—we need everybody working together on these issues.’⁷ There is broad support among experts and officials for devoting time and resources to discussing nuclear risk and risk reduction measures across domestic, bilateral and multilateral political forums.⁸

In this intervention, we interrogate the assumptions underpinning the line of thinking laid out above, arguing that the diplomatic orientation variously referred to as the nuclear risk reduction ‘framework’, ‘template’, ‘agenda’ or ‘approach’ offers a false promise for those seeking durable, shared solutions to the nuclear predicament. As understood here, the risk reduction framework involves no substan-

⁴ Gareth Evans, ‘Why the horrors of Hiroshima and Nagasaki must never be repeated’, address at opening of Hiroshima-Nagasaki Atomic Bomb Exhibition, Menzies Library, Australian National University, Canberra, 5 Sept. 2022, <https://www.gevans.org/speeches/Speech756.html>.

⁵ Gareth Evans, ‘Why the horrors of Hiroshima and Nagasaki must never be repeated’; Mishra, ‘The nuclear risk reduction approach’; Harald Müller and Carmen Wunderlich, ‘Nuclear disarmament without the nuclear-weapon states: the nuclear weapon ban treaty’, *Dædalus* 149: 2, 2020, pp. 171–89 at p. 183, https://doi.org/10.1162/daed_a_01796; Daryl Kimball, Kathy C. Robinson and Tony Fleming, ‘A new opening to reduce the nuclear danger’, Arms Control Association, 27 June 2023, <https://www.armscontrol.org/blog/2023-06/inside-aca>.

⁶ McGeorge Bundy, *Danger and survival* [1988] (New York: Vintage Books, 1990), p. 616.

⁷ US Deputy Assistant Secretary of State Alexandra Bell via YouTube, ‘What’s next for nuclear risk reduction’, side-event at the Preparatory Committee of the Review Conference of the Treaty on the Non-Proliferation of Nuclear Weapons, 1 Aug. 2023, <https://www.youtube.com/watch?v=UvcxM2mdHgo>.

⁸ See, for example, Gareth Evans, ‘Why the horrors of Hiroshima and Nagasaki must never be repeated’; Mishra, ‘The nuclear risk reduction approach’; Hilgert, Kane and Malygina, ‘The TPNW and the NPT’; Parliamentarians for Nuclear Non-Proliferation and Disarmament, ‘Parliamentary engagement vital for NPT goals of nuclear-risk reduction and disarmament’, 2 Aug. 2023, <https://www.pnnd.org/article/parliamentary-engagement-vital-npt-goals-nuclear-risk-reduction-and-disarmament>; Tong Zhao via YouTube, ‘NPT RevCon 10 side event: taking forward nuclear risk reduction’, United Nations Institute for Disarmament Research, 15 Aug. 2022, <https://www.youtube.com/watch?v=RwI9zV6nvU&t=85s>.

tive policy preferences but a procedural commitment to facilitate broad dialogue geared towards identifying, analysing and sequestering so-called nuclear risk scenarios. While this stance does not imply a position on specific policy proposals, it requires, at a minimum, a basic belief in the viability of nuclear risk analysis and the exercise of managerial control. Drawing on archival documents, historical scholarship and theories of ‘normal’ and ‘epistemic’ accidents, we identify three major challenges associated with this approach. First, meaningful risk analysis requires access to a level of knowledge and foresight that is quite simply unattainable in the secretive, and often contingent, world of nuclear politics—a world where even a single error could prove disastrous. Second, the risk reduction framework relies on an unduly instrumental view of complex techno-political systems, inviting potentially disastrous overconfidence. Third, as a policy agenda, the risk reduction framework is too indeterminate to steer political action in any particular direction; conceptions of risks and appropriate measures vary enormously, with largely unfalsifiable theories about existential deterrence, escalation dominance, brinkmanship, and conventional deterrence and defence supporting fundamentally contradictory policies. Tellingly, the risk reduction agenda has lent itself to everything from calls for deep nuclear stockpile reductions to demands for new nuclear weapons acquisitions and a resumption of explosive nuclear testing. And as long as nuclear risks remain fundamentally unmeasurable, risk analysis cannot adjudicate these disagreements. On the contrary, the risk framing can be used to justify virtually any policy.

To be clear, our gripe in this article is not with specific diplomatic measures or attempts at progressively reducing the salience of nuclear weapons in world politics. We do not mean to suggest that limited technical or diplomatic measures—be it the fitting of electronic locks on warheads, maintenance of systems for crisis communications, or doctrinal changes—cannot be worthwhile or even risk reducing in an objective sense. Instead, our contention is that these measures are not derivable from risk analysis in any meaningful way, that nuclear risks and deterrence cannot be reliably managed over the long term, and that ‘risk reduction’ offers a poor overarching framework for those eager to advance nuclear inhibition, devaluing or disarmament.⁹ Advocates of curtailing the salience of nuclear weapons, we suggest, would be better off anchoring their demands either in explicit normative injunctions or a general commitment to restraint. Contrary to the claim that the nuclear risk reduction agenda offers a pragmatic, apolitical approach to reducing nuclear dangers because it aligns with the interests of all states, we demonstrate below that the risk reduction agenda obscures a fundamental antagonism between the preferences of those who seek security *from* nuclear weapons and those who seek security *thanks to* nuclear weapons. In reality, the nuclear risk reduction framework remains severely circumscribed by the putative requirements of credible nuclear deterrence. After all, nuclear deterrence often relies on what the founder of the nuclear risk reduction school, Thomas Schelling, called a ‘threat

⁹ See Nick Ritchie, ‘Waiting for Kant: devaluing and delegitimizing nuclear weapons’, *International Affairs* 90: 3, 2014, pp. 601–23, <https://doi.org/10.1111/1468-2346.12129>.

that leaves something to chance', namely the deliberate manufacture and exploitation of nuclear risk.¹⁰

The remainder of this article is divided into three parts. In the first, we lay out the theory, practice and intellectual foundations of the nuclear risk reduction agenda. In the second, we move on to our critique, outlining the risk reduction agenda's weaknesses and contradictions. In the third and final part, we conclude and unpack the policy implications of our argument.

The theory and practice of nuclear risk reduction

The concept of nuclear risk reduction has for decades been used as a shorthand for limited policy changes geared towards lessening the chances of misperception, escalation and accidents involving nuclear arms. While the term 'nuclear risk reduction' was not in common usage until the early 1980s,¹¹ most of the institutions, activities and proposals that are today discussed under the heading of risk reduction had been introduced within two decades of the end of the Second World War. As a collection of practices, nuclear risk reduction (and arms control more broadly) entered the scene in the late 1950s and early 1960s as an alternative to the *prima facie* more ambitious projects of nuclear abolition, international control of fissile materials, and world government.¹² Measures currently identified by the permanent members of the UN Security Council as important tools of nuclear risk reduction range from the 'establishment and maintenance of bilateral crisis communication channels' to 'discussion on doctrines' and 'statements promoting restraint and reassurance'.¹³ 'Risk', in turn, is usually understood as a function of the impact and likelihood of an occurrence taking place, with nuclear weapons use typically conceived as a 'low-probability, high consequence event'.¹⁴ In the words of the Harvard Nuclear Study Group, there are no 'risk free' solutions to the nuclear predicament. The task for policy-makers is to 'weigh accurately the risks entailed in each [potential] course [of action] and decide on policy accordingly'.¹⁵

There is widespread consensus in the nuclear expert community that the intellectual foundations for the regime of nuclear risk reduction and arms management that took form in the 1960s were largely laid by Thomas Schelling,¹⁶ a scholar and

¹⁰ Thomas C. Schelling, *The strategy of conflict* [1960] (Cambridge, MA: Harvard University Press, 1980), p. 187.

¹¹ The emergence of the specific concept of 'nuclear risk reduction' in the early 1980s was hardly an accident. Most obviously, the early 1980s were marked by intense geostrategic tensions between power blocs in possession of more than 60,000 nuclear warheads between them.

¹² Kjølvs Egeland, 'Nuclear abolition from Baruch to the ban', in Cecilia M. Bailliet, ed., *Research handbook on international law and peace* (Cheltenham: Edward Elgar, 2019), pp. 244–66.

¹³ P5, 'Strategic risk reduction', working paper submitted to the Review Conference of the Parties to the Treaty on the Non Proliferation of Nuclear Weapons, NPT/CONF.2020/WP.33, 7 Dec. 2021, https://www.un.org/sites/un2.un.org/files/2021/12/npt_conf.2020_e_wp.33.pdf.

¹⁴ See, for example, Richard K. Betts and Matthew C. Waxman, 'The president and the bomb: reforming the nuclear launch process', *Foreign Affairs* 97: 2, 2018, pp. 119–28 at p. 127.

¹⁵ Albert Carnesale et al., *Living with nuclear weapons* (Cambridge, MA: Harvard University Press, 1983), p. 17.

¹⁶ Graham Allison, 'Preventing nuclear war: Schelling's strategies', *Negotiation Journal* 34: 3, 2018, pp. 291–6 at p. 294, <https://doi.org/10.1111/nejo.12231>.

policy-maker often described as the ‘father of arms control’.¹⁷ A trusted advisor for US Secretary of Defense Robert McNamara, Schelling was the pre-eminent exponent of a new, ‘scientific’ approach to strategy fuelled by formal modelling, risk analysis and a desire for managerial control. According to S. M. Amadae, the analytical approaches developed by Schelling and others at the RAND Corporation in the late 1950s and early 1960s were emblematic of a wider ideational shift in the American intelligentsia from a preoccupation with justice, freedom and ‘accord among nations’ to a concern with algorithmic judgement, utility maximization and risk management.¹⁸

Schelling’s central contribution to arms control and risk reduction thinking was the insight that nuclear risks could be managed through the careful application of reciprocally beneficial rules and policy adjustments:

the Russians and we have crawled far out on a dangerous limb; what is required is skill, care, and, above all, perseverance in reciprocally adopting postures that are safer for both of us ... Man’s capability for self-destruction cannot be eradicated—he knows too much! Keeping that capability under control—providing *incentives* that minimize recourse to violence—will require eternal skill and vigilance.¹⁹

Security, Schelling concluded, would have to be found in the ‘eternal’ management of risks. Nuclear abolition, after all, was in his view neither feasible nor desirable. This latter position was informed by the idea that short- and long-term nuclear risks were often inversely related: while total disarmament would by definition render nuclear war impossible in the immediate term, it would in Schelling’s view increase nuclear risks in the future by incentivizing the disarmed to rebuild and quickly employ their arsenals, be it to secure advantage in the heat of a conventional war or in a ‘quick dash for supremacy’ during peacetime.²⁰ What is more, Schelling thought the risk of all-out war (a low-probability, high-consequence event) had to be weighed against the risk of recurring bouts of ‘less-than-mortal’ aggression (high-probability, lower-consequence events).²¹

Conceding that it might not be credible to threaten mutual annihilation in response to, say, limited Soviet provocations against allies in another hemisphere, Schelling argued that military arrangements might be set up in such a way that catastrophic escalation could not be ruled out even if the defender, i.e., the United States, was resolved to prevent it. It might be rational, he found, to deliberately create a risk of war ‘that one does not completely control’.²² That way, enemies would realize that the risk of all-out war ‘depends on their own behavior, rising when they aggress and intimidate, falling when they relax their pressure against

¹⁷ Matt Korda, *Siloed thinking: a closer look at the ground-based strategic deterrent* (Washington DC: Federation of American Scientists, 2021), p. 21; Joseph S. Nye, ‘Farewell to arms control’, *Foreign Affairs* 65: 2, 1986, pp. 1–20 at p. 6, <https://www.foreignaffairs.com/articles/russian-federation/1986-09-01/farewell-arms-control>; Gregg Herken, *Counsels of war* (New York: Knopf, 1985), p. 313.

¹⁸ S. M. Amadae, *Prisoners of reason* (Cambridge, UK: Cambridge University Press, 2015), p. 11 (italics in original).

¹⁹ Thomas C. Schelling, ‘The future of arms control’, *Operations Research* 9: 5, 1961, pp. 722–31 at p. 731.

²⁰ Schelling, ‘The future of arms control’, p. 724.

²¹ Schelling, ‘The future of arms control’, p. 724; Schelling, *The strategy of conflict*, ch. 8.

²² Schelling, *The strategy of conflict*, p. 200.

other countries.²³ Developed at the Air Force-funded RAND Corporation in the late 1950s, the idea of the ‘threat that leaves something to chance’ remains Schelling’s most significant legacy next to his work on arms control.²⁴ While analysts and intellectual historians have traditionally classified Schelling as an advocate of restraint whose work stood in opposition to the more hawkish school of ‘nuclear war strategism’ associated above all with Herman Kahn,²⁵ Schelling shared with Kahn and other ‘hawks’ the view that deterrence was difficult to achieve and would in many cases have to be reinforced through aggressive or risky behaviour.

While the degree of Schelling’s personal influence can be debated—the policies in question were largely in place by the time Schelling’s work on the topic was published—the nuclear posture maintained by the United States during the Cold War has often been interpreted as an implementation of the ‘threat that leaves something to chance’.²⁶ At the height of the Cold War, the United States deployed more than 4,000 nuclear warheads to West Germany alone. Many of these were ‘usable’ nuclear artillery shells and mines deployed close to the border with the Warsaw Pact. The result was the creation of what some analysts have described as a ‘regional doomsday machine’,²⁷ a system liable to ‘chaos, loss of political control ... and rapid nuclear escalation in the event of a serious crisis or conflict’.²⁸ This system, presumably, was the only way to get past the credibility problem at the heart of the strategy of extended nuclear deterrence, namely that no US president could realistically be expected to willingly wage nuclear war, risking the complete annihilation of American society, on behalf of allies and partners in another hemisphere.²⁹ The creation of a regional doomsday machine in Europe bypassed this problem. After all, the material situation was such that, in the event of a Warsaw Pact incursion, western political leaders might not be able to stop escalation even if they wanted to, as any military commander in the field would be ‘tempted to utilize all his available weapons’ to avoid being overrun by the enemy.³⁰ Admittedly, the introduction and improvement of permissive

²³ Schelling, *The strategy of conflict*, p. 189.

²⁴ See Benjamin Wilson, ‘Keynes goes nuclear: Thomas Schelling and the macroeconomic origins of strategic stability’, *Modern Intellectual History* 18: 1, 2021, pp. 171–201, <https://doi.org/10.1017/S1479244319000271>. The original report is: Thomas C. Schelling, ‘The threat that leaves something to chance’, The RAND Corporation, 10 Aug. 1959, https://www.rand.org/content/dam/rand/pubs/historical_documents/HDA1600/HDA1631-1/HDA1631-1.pdf.

²⁵ See, for example, Daniel Deudney, ‘The great debate: the nuclear-political question and world order’, in Alexandra Gheciu and William C. Wohlforth, eds, *The Oxford handbook of international security* (Oxford: Oxford University Press, 2018), pp. 334–49 at p. 339; Emanuel Adler, ‘The emergence of cooperation: national epistemic communities and the international evolution of the idea of nuclear arms control’, *International Organization* 46: 1, 1992, pp. 101–45 at p. 113, <https://doi.org/10.1017/S002081830001466>.

²⁶ See, for example, Lawrence Freedman, ‘Framing strategic deterrence: old certainties, new ambiguities’, *The RUSI Journal* 154: 4, 2009, pp. 46–50, at p. 48, <https://doi.org/10.1080/03071840903216452>; Paul Bracken, *The command and control of nuclear forces* (New Haven, CT: Yale University Press, 1983), p. 174.

²⁷ Bracken, *The command and control of nuclear forces*, p. 164; Stephen D. Biddle and Peter D. Feaver, ‘Roles and missions of battlefield nuclear weapons’, in Stephen D. Biddle and Peter D. Feaver, eds, *Battlefield nuclear weapons* (Lanham, MD: University Press of America, 1989), pp. 3–12.

²⁸ Shaun R. Gregory, *Nuclear command and control in NATO* (London: Palgrave Macmillan, 1996), p. 194.

²⁹ Gregory, *Nuclear command and control in NATO*, p. 194.

³⁰ Henry A. Kissinger, ‘Limited war: conventional or nuclear? A reappraisal’, *Dædalus* 89: 4, 1960, pp. 800–17 at p. 812.

action links (electronic locks on warheads) over the course of the 1960s and 1970s reduced field commanders' freedom to initiate nuclear weapons use in the absence of presidential authorization to do so. Yet the United States retained thousands of nuclear weapons close to the East German border, 'in a "use-it-or-lose-it" position vulnerable to being overrun in the early hours of an invasion'.³¹

According to one critic, those responsible for NATO's Cold War nuclear policy 'took a terrible risk with the security of Europe'.³² However, as suggested above, it was precisely risk thinking that justified the doomsday machine's establishment. Schelling and those acting in line with his conclusions simply judged that eschewing nuclear risks in the near term would incur greater risks over the long term. In the event of a near-term clash, he argued, NATO and the Warsaw Pact 'would do everything possible to keep nuclear weapons out of that war'.³³ And precisely for that reason, the United States could use the ghost of inadvertent escalation to put the Soviets on the back foot; brinkmanship, in Schelling's view, was 'a competition in risk-taking'.³⁴ In the words of Campbell Craig, the overall thrust of Schelling's work was an appeal for 'an activist, aggressive policy of nuclear intimidation'.³⁵ Schelling's articulation of the 'threat that leaves something to chance' helped normalize enormous risks, turning the prospect of omnicide into a perceived condition for global security.

In summary, for nuclear deterrent threats to be credible, an element of risk must be present. In the words of Joseph Nye, '[i]f there is absolutely no possibility of the use of nuclear weapons, or if that is believed to be the case, they will have no deterrent effects'.³⁶ According to the authors of a 1995 US Strategic Command report,

the fact that some elements [in the American nuclear command] may appear to be potentially 'out of control' can be beneficial to creating and reinforcing fears and doubts within the minds of an adversary's decision makers. This essential sense of fear is the working force of deterrence. That the US may become irrational and vindictive if its vital interests are attacked should be part of the national persona we project to all adversaries.³⁷

In the words of Joan Rohlfing, nuclear risk is 'built into the DNA of the nuclear deterrence system'.³⁸

³¹ Steve Fetter and Jon Wolfsthal, 'No first use and credible deterrence', *Journal for Peace and Nuclear Disarmament* 1: 1, 2018, pp. 102–14 at p. 106, <https://doi.org/10.1080/25751654.2018.1454257>.

³² Gregory, *Nuclear command and control in NATO*, p. 192.

³³ Thomas C. Schelling, 'The thirtieth year', *Dædalus* 120: 1, 1991, pp. 21–32 at p. 30.

³⁴ Schelling, *Arms and influence* (New Haven, CT: Yale University Press, 1966) p. 91.

³⁵ Campbell Craig, *Destroying the village: Eisenhower and thermonuclear war* (New York: Columbia University Press, 1998), p. 156.

³⁶ Joseph S. Nye Jr, *Nuclear ethics* (New York: Free Press, 1986), p. 52. In a 2023 forum on Nye's book, Sharon Weiner powerfully restates the contemporary validity of the claim that the choice to practice nuclear deterrence is a choice to maintain a nuclear risk. Sharon Weiner, 'The ethics of choosing deterrence', *Ethics & International Affairs* 37: 1, 2023, pp. 29–38, <https://doi.org/10.1017/S0892679423000011>.

³⁷ US Strategic Command, *Essentials of post-Cold War deterrence* (Washington DC: US Department of Defense, 1995), <https://www.nukestrat.com/us/stratcom/SAGessentials.PDF>, p. 7. We are grateful to Martin Hellman for pointing this reference out.

³⁸ Joan Rohlfing via YouTube, 'New research directions for nuclear risk reduction', Cambridge Existential Risks Initiative, 29 July 2021, <https://www.youtube.com/watch?v=oZ1K4lveorY>.

Three challenges to the risk reduction framework

As an approach to reducing nuclear dangers and steering meaningful diplomatic action, the risk reduction framework suffers from at least three major deficiencies. These relate, first, to the limits of knowledge; second, to the problem of overconfidence; and third, to political action and implementation. We go through each of these challenges in turn.

The limits of knowledge

Risk is not a thing or object. Rather, as Mary Douglas points out, risk is an abstract concept for ranking and making sense of dangers—it is ‘a way of thinking’.³⁹ In turn, this way of thinking relies on a particular set of assumptions about how the world works. A first central assumption underpinning risk analysis—and, by extension, the nuclear risk reduction agenda—is that relevant ‘risk scenarios’ can all be identified, analysed and preferably addressed before they manifest.⁴⁰ Risk analysis is therefore commonly understood to operate on the premise that the world is, by and large, formulaic and amenable to probability calculations.⁴¹ In the words of the Deputy Director of the United Nations Institute for Disarmament Research (UNIDIR), the nuclear risk reduction agenda obliges relevant actors to first identify and then prevent ‘all risk scenarios from coming into fruition’.⁴² In this view, stakeholders must have the knowledge and foresight to map out a full ‘event tree’ of possible choices, errors, accidents, misunderstandings and interrelationships. In other words, they must be able to effectively predict the future at a highly granular level. Mischaracterizing or failing to identify only a single branch of the event tree could upset the entire calculation, leading policymakers down treacherous paths. The trouble is that information about motives, decision-making, deterrence practices and close calls is often concealed or otherwise unavailable, making it difficult or impossible to build an accurate ‘event tree’. As with international relations more generally, the nuclear world is characterized not by calculable risk but unpredictability, secrecy, contingency and potentially unprecedented events that cannot be assigned a reliable probability. Nuclear politics is also unique in that only a single error could prove catastrophic on a truly

³⁹ Mary Douglas, ‘Risk and danger’, in Mary Douglas, *Risk and blame: essays in cultural theory* (London: Routledge, 1992), p. 46.

⁴⁰ See Robert J. Downes and Christopher Hobbs, ‘Nuclear terrorism and virtual risk: implications for predictions and the utility of models’, *European Journal of International Security* 2: 2, 2017, pp. 203–22 at pp. 206–8, <https://doi.org/10.1017/eis.2017.5>. So-called frequentist probabilities can only be produced on the basis of complete and reliable data about the past. Both of these conditions are problematic for would-be nuclear risk analysts. Another challenge, which plagues both frequentist and Bayesian approaches to probability, is that only risk scenarios or events that have already occurred can be assigned a meaningful probability.

⁴¹ Peter J. Katzenstein and Lucia A. Seybert, ‘Protean power and control power: conceptual analysis’, in Peter J. Katzenstein and Lucia A. Seybert, eds, *Protean power: exploring the uncertain and unexpected in world politics* (Cambridge, UK: Cambridge University Press, 2018), p. 18.

⁴² Cecile Aptel, Opening remarks, ‘Nuclear risk reduction: friction points’, event organized by United Nations Institute for Disarmament Research, 19 Oct. 2021. See, for example, also Wilfred Wan, ‘Executive summary’, in Wan, ed., *Nuclear risk reduction: closing pathways to use*, p. 3.

civilizational level.⁴³ Using the language of Peter Katzenstein and Lucia Seybert, the world of nuclear deterrence may thus be most appropriately understood as an unpredictable ‘world of uncertainty’, not a formulaic ‘world of risk’.⁴⁴ To paraphrase Donald Rumsfeld, standard risk analysis offers an insufficient or even dangerous approach to nuclear security because it invites actors to proceed on the basis of ‘known knowns’ (risk scenarios we are aware of and can predict perfectly) and ‘known unknowns’ (risk scenarios we are aware of but cannot fully predict; ‘the threat that leaves something to chance’ belongs here), missing both ‘unknown knowns’ (risk scenarios we think we understand but have in fact misconstrued) and unknown unknowns (risk scenarios we have not even thought of).⁴⁵

Nuclear arsenals and deterrence practices make up enormous, complex technological systems. According to theorists of ‘normal accidents’, systems characterized by high degrees of ‘interactive complexity’ and ‘tightly coupled’ operations are bound to suffer major accidents over the long term because the interaction of all system components cannot be fully predicted in advance; unforeseen combinations or sequences of events will inevitably produce disaster.⁴⁶ Another challenge relates to the limits of available technical and engineering knowledge. Major ‘epistemic accidents’ can occur when ‘a scientific or technological assumption proves to be erroneous, even though there were reasonable and logical reasons to hold that assumption before (although not after) the event’.⁴⁷ Given the limits of nuclear knowledge, the burden of proof ought to be on those advocating aggressive deterrence policies to demonstrate that the postures they recommend are safe in the long term. All the more so as local nuclear wars, whether deliberate, inadvertent or accidental, might cause harm globally.⁴⁸

An important case in point is the Cuban Missile Crisis, during which faulty or lacking information came close to fostering ruin. For example, the American officers and officials who in October 1962 counselled president Kennedy to take military action against Cuban/Soviet targets were not aware that the Soviet submarines present in the Sargasso Sea were armed with nuclear torpedoes

⁴³ James Blight and Janet Lang interestingly note that Robert McNamara ‘refused to participate in discussions of issues like “how probable was nuclear war in the Cuban missile crisis?” on the grounds that he could not care less what the probability was, and in any case no one will ever know what the probability was anyway’: James G. Blight and Janet M. Lang, *Dark beyond darkness* (New York: Rowman & Littlefield, 2017), p. 58.

⁴⁴ Katzenstein and Seybert, ‘Protean power and control power’, p. 18.

⁴⁵ For detailed evidence of nuclear weapons policy analysts reducing uncertainty to risk, see Benoît Pelopidas, ‘The unbearable lightness of luck: three sources of overconfidence in the controllability of nuclear crises’, *European Journal of International Security* 2: 2, 2017, pp. 240–62 at pp. 248–50, <https://doi.org/10.1017/eis.2017.6>; and Richard Ned Lebow and Benoît Pelopidas, ‘Facing nuclear war: luck, learning and the Cuban Missile Crisis’, in Mlada Bukovansky, Edward Keene, Christian Reus-Smit and Maja Spanu, eds, *Oxford handbook of history and International Relations* (Oxford: Oxford University Press, 2023), pp. 705–20.

⁴⁶ Charles Perrow, *Normal accidents: living with high-risk technologies* [1984] (Princeton: Princeton University Press, 1999). See also Matthew Rendall, ‘Nuclear war as a predictable surprise’, *Global Policy* 13: 5, 2022, pp. 782–91, <https://doi.org/10.1111/1758-5899.13142>; Scott Sagan, ‘The problem of redundancy problem: why more nuclear security forces may produce less nuclear security’, *Risk Analysis* 24: 4, 2004, pp. 935–46 at p. 937, <https://doi.org/10.1111/j.0272-4332.2004.00495.x>.

⁴⁷ John Downer, ‘737-Cabriolet: the limits of knowledge and the sociology of inevitable failure’, *American Journal of Sociology* 117: 3, 2011, pp. 725–62 at p. 752, <https://doi.org/10.1086/662383>.

⁴⁸ Lili Xia et al., ‘Global food insecurity and famine from reduced crop, marine fishery and livestock production due to climate disruption from nuclear war soot injection’, *Nature Food*, vol. 3, 2022, pp. 586–96, <https://doi.org/10.1038/s43016-022-00573-0>.

and that their commanders had de facto ability to use them. American policy-makers were also not aware of the strength of Soviet ground forces on Cuba, nor were they aware that the Soviet contingents on Cuba were equipped with tactical nuclear weapons ready to be used at short notice. By all accounts, US policy-makers seriously underestimated the likelihood of nuclear escalation.⁴⁹ As recently concluded by two of the world's foremost scholars of the Missile Crisis: we now know that nuclear war could have commenced in many ways 'and under many conditions' that US policy-makers 'could not foresee, simply because the U.S. government lacked the relevant information'.⁵⁰ Daniel Ellsberg, who was a risk assessor advising the Pentagon and the State Department at the time of the crisis, later acknowledged that his risk estimate at the time was far too low because he did not know about potential paths to disaster that would later be discovered.⁵¹ Luckily, Kennedy concluded that he was not in a world of calculable risk and resisted the 'bellicose counsel' he received from the Joint Chiefs of Staff, the Executive Committee and Congressional leaders.⁵²

Overconfidence

A second key assumption underpinning the risk reduction framework is that nuclear arms and deterrence practices are straightforward tools or instruments without emergent properties, a view described in Science and Technology Studies as 'instrumentalism'.⁵³ Analytically, this assumption encourages faith in human management and control. As argued by Esther Eidinow, risk thinking is about 'control, and faith in that control'.⁵⁴ Faith in control is clearly visible in the analysis of leading nuclear risk theorists, including Thomas Schelling and Albert and Roberta Wohlsetter. For example, in a 1960 RAND memo, Schelling expressed confidence in the ability of nuclear-armed leaders to perform 'a controlled loss of control' to bolster the credibility of necessary, risk-reducing deterrent threats.⁵⁵ In *The strategy of conflict*, published soon after the RAND memo, Schelling doubled down on the ability of leaders to exercise managerial control, arguing that 'a

⁴⁹ See Robert Jervis, 'The Cuban Missile Crisis: what can we know, why did it start, and how did it end?', in Len Scott and R. Gerald Hughes, eds, *The Cuban Missile Crisis: a critical reappraisal* (Abingdon: Routledge, 2015), p. 4.

⁵⁰ Blight and Lang, *Dark beyond darkness*, p. 64.

⁵¹ Daniel Ellsberg, *The Doomsday machine: confessions of a nuclear war planner* (New York: Bloomsbury, 2017), chapter 13.

⁵² Sheldon M. Stern, 'Beyond the smoke and mirrors: the real JFK White House Cuban Missile Crisis', in Scott and Hughes, eds, *The Cuban Missile Crisis*, p. 217. See also Harald Müller, 'Icons off the mark: Waltz and Schelling on a perpetual brave nuclear world', *Nonproliferation Review* 20: 3, 2013, pp. 545–65 at pp. 549–50, <https://doi.org/10.1080/10736700.2013.849911>; Sheldon M. Stern, *The Cuban Missile Crisis in American memory: myth versus reality* (Stanford, CA: Stanford University Press, 2012).

⁵³ Richard Wyn Jones, 'The nuclear revolution', in Alex Danchev, ed., *Fin de siècle: the meaning of the twentieth century* (New York and London: I.B. Tauris, 1995), p. 97.

⁵⁴ Esther Eidinow, *Luck, fate and fortune: antiquity and its legacy* (London: I.B. Tauris, 2011), p. 158. Similarly, Louise Amoore argued that 'risk technologies have, at their heart, a particular relationship to the future. They hold out the promise of managing uncertainty and making an unknowable and indeterminate future knowable and calculable'. Louise Amoore, *The politics of possibility: risk and security beyond probability* (Durham, NC: Duke University Press, 2013), p. 7.

⁵⁵ Thomas C. Schelling, 'The role of theory in the study of conflict', RAND Research Memorandum, RM-2515-PR, 13 Jan. 1960, p. 28, cited in Marc Trachtenberg, 'Strategic thinking in America 1952–1966', *Political Science Quarterly* 104: 2, 1989, pp. 301–34 at p. 311, <https://doi.org/10.2307/2151586>.

limited war can get out of hand by degrees. At any point one has some notion or sensation of how much “out of control” it is.⁵⁶ According to Ned Lebow, mainstream analysts

downplayed luck, and Schelling totally denied its role. At a conference on the missile crisis held several decades later he told a small group of us over dinner that there was never any doubt in his mind that the Soviets would capitulate ... As for his fellow Harvard professors who had worried about war during the crisis, they were ‘a bunch of nervous nellies’.⁵⁷

In fact, Schelling saw the Missile Crisis as a welcome development that had allowed the United States to demonstrate resolve in the face of Soviet pressure and thus reduce the risk of general war; it was ‘the best thing to happen to us [the United States] since the Second World War’.⁵⁸ This judgement grew out of Schelling’s views, firstly, that the Soviet Union was an intransigent, expansionist power that could only be deterred through credible threats of nuclear violence, and, secondly, that the probability of nuclear war in the near term was minute.⁵⁹ As discussed below, however, current historiography suggests that Schelling almost certainly overestimated the Soviet Union’s expansionist ambitions (or at any rate its capacity to expand) while underestimating the likelihood of nuclear war.⁶⁰ Ultimately, Schelling’s estimate of risk was ‘entirely arbitrary’.⁶¹

Albert and Roberta Wohlstetter, for their part, concluded in a 1965 *Adelphi Paper* that ‘in the end it was President Kennedy’s and Chairman Khrushchev’s decisions that determined events’ during the Missile Crisis. While admittedly expressing some concern about the possibility of miscommunication, the Wohlstetters added that ‘the United States and the Soviet Union were both in full control of their nuclear forces’.⁶² Were they? Three decades after the Cuban Missile Crisis, following the surfacing of a wealth of evidence about several highly contingent incidents that took place during October 1962, Scott Sagan concluded that ‘President Kennedy may well have been prudent. He did not, however, have unchallenged final control over U.S. nuclear weapons’.⁶³ The same applied to Khrushchev. Both leaders had delegated the authority, or at least capability, to use nuclear weapons to field commanders.⁶⁴ Both had made threats that left something

⁵⁶ Schelling, *The strategy of conflict*, p.193.

⁵⁷ Richard Ned Lebow, *Between peace and war* [1981] (London: Palgrave MacMillan, 2020), p. xii.

⁵⁸ James G. Blight and David A. Welch, *On the brink: Americans and Soviets reexamine the Cuban Missile Crisis* (New York: Hill and Wang, 1989), p. 104.

⁵⁹ Blight and Welch, *On the brink*, p. 104.

⁶⁰ Len Scott, ‘The only thing to look forward to’s the past’, in Scott and Hughes, eds, *The Cuban Missile Crisis*, pp. 241–2; Serhii Plokhyy, *Nuclear folly: a history of the Cuban Missile Crisis* (New York: W.W. Norton, 2021); Martin Sherwin, *Gambling with Armageddon: nuclear roulette from Hiroshima to the Cuban Missile Crisis* (New York: Knopf, 2020).

⁶¹ Richard Ned Lebow, ‘Thomas Schelling and strategic bargaining’, *International Journal* 51: 3, 1996, pp. 555–76 at p. 575, <https://doi.org/10.2307/40203128>. For an earlier statement that theorists such as Schelling invoke probabilistic reasoning ‘where no discoverable probabilities exist’, see Philip Green, *Deadly logic* [1966] (New York: Schocken, 1968) p. 37.

⁶² Albert and Roberta Wohlstetter, *Controlling the risks in Cuba* (London: Institute for Strategic Studies, 1965) pp. 14, 17.

⁶³ Scott D. Sagan, *The limits of safety: organizations, accidents, and nuclear weapons* (Princeton: Princeton University Press, 1993), p. 116.

⁶⁴ Sagan, *The limits of safety*, pp. 78–80; Ellsberg, *The Doomsday machine*, ch. 3.

to chance; both were eager to reduce risks. And yet the world was brought to the brink of global pandemonium.

Consider, for example, an episode that occurred the night of 27–28 October 1962. While the historical accounts diverge on certain details, they each show that perfect control alone cannot account for the absence of unwanted nuclear explosions. According to historian Serhii Plokyh, an American aircraft fired tracer bullets at a Soviet submarine that had been shadowed and forced to the surface by American surface vessels. Under fire and with American flares going off in the sky, the submarine captain concluded that he was under attack. He promptly gave the order to dive and prepare the nuclear torpedo for firing. However, on the way down from the bridge, ‘the signals officer got stuck with his searchlight in the shaft of the upper hatch of the conning tower, thereby delaying the commander’.⁶⁵ This fortuitous delay gave the Soviet officers time to receive an apology sent via searchlight from one of the American surface vessels. The Soviets could thus conclude that they were not under attack after all, and the order to prepare the torpedo for firing was reversed. Historian Martin Sherwin’s account does not mention the stuck searchlight or strafing by a tracking aircraft. Sherwin instead emphasizes the decisive role of one of the officers on board, Vasili Arkhipov, who is claimed to have opposed the order to fire the nuclear torpedo, in large part because of his first-hand experience of the effect of radiation following an accident fifteen months earlier.⁶⁶ In either case, ‘although they did not know it at the time’, the American seamen appear to have been ‘moments away from being killed or shipwrecked by the tremendous waves that a nuclear explosion would produce’.⁶⁷ The strategic consequences of such an explosion might well have proved considerable. Plokyh concludes: ‘In response to a nuclear attack on the US Navy, the president would have had little choice but to order an air strike against Soviet targets. The Soviets would have had little choice but to retaliate, whether they wanted to do so or not.’⁶⁸

RAND analyst Albert Wohlstetter, however, continued to deny the leaders’ imperfect control of events in the crisis, even after the surfacing of persuasive evidence to the contrary. In fact, Wohlstetter continued to deny the fact that field commanders would have had the ability to launch nuclear weapons even after the explicit admission by Kennedy’s National Security Advisor McGeorge Bundy that this had indeed been the case. ‘I doubt very much there had been such predelegation or that Mac [Bundy] would have known if there had been’, Wohlstetter persisted.⁶⁹ As late as 1986, Wohlstetter still believed in a narrative of perfect control, writing that he did not believe the superpowers had been ‘anywhere near the brink of nuclear war’ or that either side ‘came close at all to letting things get

⁶⁵ Plokyh, *Nuclear folly*, p. 271.

⁶⁶ Sherwin, *Gambling with Armageddon*, pp. 27–8.

⁶⁷ Plokyh, *Nuclear folly*, p. 272.

⁶⁸ Plokyh, *Nuclear folly*, p. 272. On the near inevitability of American retaliation, see also Sherwin, *Gambling with Armageddon*, p. 28; Blight and Lang, *Dark beyond darkness*, p. 148.

⁶⁹ Note dated 4 April 1986, ‘McG memo to JFK on controlling decision to use nuclear weapons’, Albert Wohlstetter papers, Stanford, CA: Hoover Institution archives, Box 118, folder 29.

out of control'.⁷⁰ Along similar lines, Maxwell Taylor, chairman of the US Joint Chiefs of Staff at the time of the Missile Crisis, argued a few years earlier that 'if at any time we were sitting on the edge of Armageddon, as nonparticipants [in the crisis] have sometimes alleged, we were too unobservant to notice it.'⁷¹ Taylor had previously described himself as 'a practicing optimist, having found long ago that pessimism plays into the hands of the enemy'.⁷²

Although the Cuban Missile Crisis is often regarded as having ushered in a series of risk reduction measures that reduced the probability of nuclear war, nuclear close calls continued to bubble under the surface of the ostensible nuclear 'order' established in the 1960s.⁷³ In some of these cases, the non-catastrophic outcome of the incident cannot be fully explained by the implementation of control practices or risk management. In other words, humanity was obliged to rely, in part, on luck.⁷⁴ For example, errors at the North American Aerospace Defense Command in the US and with the Soviet early warning system fostered dangerous incidents in the 1970s and 1980s. Further, given that it took over three decades to get a relatively complete picture of the Cuban Missile Crisis, and given the lack of transparency in most nuclear-armed states about past close calls, it is very likely that we underestimate how many close calls there have been, including in the age of nuclear risk reduction and 'order'. The risk reduction agenda relies on an implicit bet that luck will be on our side in the future.

A blank cheque for the producers of risk associated with nuclear deterrence

A third overarching challenge associated with the risk reduction agenda is that, despite universal agreement on the need to reduce the risk of nuclear disaster, there is no agreement, let alone consensus, about *which* risks should be dealt with, *how* risks should be sequestered, the *implications* of addressing one risk for other risk scenarios, the *timing* and *order* in which the various risks should be treated, or

⁷⁰ Note dated 26 Feb. 1986, 'Robert McNamara and Hans Bethe on nuclear war', Albert Wohlstetter papers, Stanford, CA: Hoover Institution archives, Box 118, folder 25, pp. 5–6. Wohlstetter is consistent in making this point both in his private papers and in his oral history interview with the US Department of Defense recorded earlier that year. Oral history interview with Professor Albert Wohlstetter, held in Los Angeles, California, on 30 January 1986, at 3:15 pm by Dr Maurice Matloff, p. 19.

⁷¹ Maxwell D. Taylor, 'Reflections on a grim October', *Washington Post*, 5 Oct. 1982, <https://www.washingtonpost.com/archive/politics/1982/10/05/reflections-on-a-grim-october/d69b4359-344b-4a89-a218-63f57aecebe2>. While multiple references to 'general war' in the ExComm meeting transcripts suggest that a number of participants did indeed worry about catastrophic escalation, McNamara (then US Secretary of Defense) has claimed that he and Kennedy never actually discussed nuclear war during the crisis. Along somewhat similar lines, Eisenhower reportedly counselled Kennedy on 22 Oct. that he did not think the Soviets would use nuclear weapons. For Eisenhower's view, see Timothy Naftali, Ernest May and Philip D. Zelikow, eds, *The presidential recordings* (New York: W.W. Norton, 2001), vol. 3, p. 15.

⁷² Maxwell D. Taylor, *Swords and plowshares: a memoir* (New York: W.W. Norton, 1972), p. 16.

⁷³ Patricia Lewis, Heather Williams, Benoit Pelopidas and Sasan Aghlani, *Too close for comfort: cases of near nuclear use and options for policy* (London: Royal Institute of International Affairs, 2014), https://www.chathamhouse.org/sites/default/files/field/field_document/20140428TooCloseforComfortNuclearUseLewisWilliamsPelopidasAghlani.pdf.

⁷⁴ 'Lucky' nuclear close calls can be defined as instances in which unwanted nuclear explosions were avoided either 'independently' of control practices, 'despite' control practices, or 'because of the failure of' control practices. Pelopidas, 'Power, luck and scholarly responsibility at the end of the world(s)', *International Theory* 12: 3, 2020, p. 463, <https://doi.org/10.1017/S1752971920000299>.

even *what* is a risk scenario in the first place. As a concept, risk reduction constitutes a ‘floating’ or ‘open’ signifier, i.e., an idea without a clear referent or agreed-upon meaning.⁷⁵

The range of proposed nuclear risk reduction measures shows that virtually any nuclear-weapons policy short of deliberate extinction can be labelled as ‘risk reduction’. While, for some, risk reduction demands the adoption of nuclear ‘no first use’ policies, the de-alerting of all nuclear weapons or the cancellation of a range of ongoing nuclear modernization programmes,⁷⁶ for others, risk reduction requires precisely the opposite. The underlying problem, as suggested above, is that the effects of risk reduction measures are contested and effectively unmeasurable. Thus, for one analyst, risk reduction demands that the United States commits resources towards modernizing each of the three legs of the nuclear triad it developed during the Cold War, i.e., land-based nuclear missiles, submarine-based nuclear forces and nuclear-capable bombers. In this perspective, ‘the triad’s mutually reinforcing components ... greatly complicates an enemy’s planning and, in so doing, reduces the risk of war’.⁷⁷ For another, any benefits of no first use are outweighed by ‘three major risks’, including the emboldening of adversaries, enfeebling of allies and fuelling of nuclear proliferation.⁷⁸ For a third analyst, nuclear risk reduction involves ‘having more than one warhead available per delivery system’ and ‘an arsenal that is not “too small”’.⁷⁹ For others still, nuclear risks could be meaningfully reduced through a resumption of explosive nuclear testing by the United States. Testing, in this view, would help the US government maintain a safe and credible nuclear deterrent, which in turn dissuades others from engaging in nuclear intimidation or use.⁸⁰ Wary of destabilizing disinformation, the Chinese government harbours serious scepticism towards communication hotlines. It also sees increased armament as an important instrument for bolstering deterrence and, by implication, reducing the risk of nuclear escalation.⁸¹ To be fair, some proponents of the nuclear risk reduction framework have shown awareness that their agenda could become a catch-all category with little substantive content or meaning.

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 ... or creating new forms of unhelpful nuclear ambiguity.⁸²

⁷⁵ See Claude Lévi-Strauss, *Introduction to the work of Marcel Mauss* [1950], transl. by Felicity Baker (London: Routledge, 1987), p. 63.

⁷⁶ See, for example, Hilgert, Kane and Malygina, ‘The TPNW and the NPT’.

⁷⁷ Andrew F. Krepinevich Jr., *Modernizing the nuclear triad: decline or renewal?* (Washington DC: Hudson Institute, 2021), https://www.realcleardefense.com/articles/2021/10/23/modernizing_the_nuclear_triad_decline_or_renewal_800279.html.

⁷⁸ John R. Harvey, ‘Assessing the risks of a nuclear “no first use” policy’, *War on the Rocks*, 5 July 2019, <https://warontherocks.com/2019/07/assessing-the-risks-of-a-nuclear-no-first-use-policy>.

⁷⁹ Christopher Ford, ‘Complexity and nuclear risk reduction’, remarks at Chatham House, London, 13 Dec. 2021, <https://www.newparadigmsforum.com/complexity-and-nuclear-risk-reduction>.

⁸⁰ Dallas Boyd, ‘Avoiding self-inflicted wounds to the credibility of the US nuclear deterrent’, *The Nonproliferation Review* 26: 1–2, 2019, pp. 105–26 at pp. 110–11, <https://doi.org/10.1080/10736700.2019.1598033>.

⁸¹ Tong Zhao via YouTube, ‘Averting catastrophe: walking the talk on nuclear risk reduction and crisis communication’, Institute for Security and Technology, 16 Nov. 2022, https://www.youtube.com/watch?v=IJB_yDk9BUk&t=3s.

⁸² Wilfred Wan, *Nuclear risk reduction: the state of ideas* (Geneva: United Nations Institute for Disarmament

The indeterminacy of the risk reduction agenda means that progress cannot be verified. By extension, those in power cannot be held accountable for their actions one way or another. The risk reduction agenda, in other words, lends itself to public relations efforts by powerful nuclear actors eager to reassure members of the public that the perpetual retention and rebuilding of nuclear armouries in an anarchic world remains safe. As pointed out also by some of the risk reduction framework's proponents, 'nuclear-armed States often cite improvements to the safety, security and reliability of their nuclear weapons in describing their extensive modernization programmes'.⁸³ Indeed, it is notable that the re-emergence of the nuclear risk reduction framework in nuclear policy discourse in recent years has coincided with the initiation by all nuclear-armed states of large-scale nuclear build-ups or modernization programmes. As Charles Perrow reminds us, often, the function of those working to assess or reduce risks 'is not only to inform and advise ... , but also, should the risk be taken, to legitimate it and reassure the subjects'.⁸⁴

Conclusion

The nuclear risk reduction framework has received renewed attention in recent years. According to its proponents, nuclear risk reduction offers a straightforward, apolitical framework for addressing nuclear dangers. We disagree, maintaining instead that the nuclear risk reduction agenda offers a false promise for those seeking durable, shared solutions to the nuclear predicament and, by extension, actual risk reduction over the long term. We have offered three arguments to substantiate this claim. First, accurate risk analysis requires a level of knowledge and foresight that is not achievable in nuclear weapons politics. Second, risk analysis invites a faith in managerial control that invariably plays down luck and contingency, fosters potentially dangerous overconfidence, and helps normalize civilizational vulnerabilities. Third, the risk reduction agenda is too indeterminate to offer political guidance or direction. While some argue that risk reduction demands stockpile reductions or the adoption of no first use nuclear policies, others argue that risk reduction is best achieved through nuclear modernization programmes and brinksmanship. Risk taking in the short term can often be argued to reduce risks in the longer term, and risk reduction efforts in one area can frequently increase risks in others. In the absence of better information, risk analysis offers no tools to adjudicate these competing claims.

Proponents of the nuclear risk reduction agenda would be right to point out that the current international security environment does not look particularly conducive to radical nuclear policy changes. Implementing common-sense

Research, 2019), p. 2.

⁸³ Wilfred Wan, *Nuclear risk reduction: a framework for analysis* (Geneva: UNIDIR, 2019), p. 37.

⁸⁴ Perrow, *Normal accidents*, pp. 306–15 at p. 307. The validity of this point is corroborated in Lee Clarke's study of 'fantasy documents' using risk analysis such as Federal Emergency Management Agency plans for civil defence and mail delivery after nuclear war to perform the continued possibility of planning. See Lee Clarke, *Mission improbable: using fantasy documents to tame disaster* (Chicago: University of Chicago Press, 1999), pp. 30–40.

measures of restraint would be better than doing nothing, they might argue. We do not disagree. Our objection is that the radical uncertainty that defines the nuclear world renders 'risk reduction' a poor frame for diplomatic action. If what proponents of 'nuclear risk reduction' really want to do is to promote nuclear de-alerting, new or improved communication hotlines, 'deterrence only' postures, or the adoption of no first use policies, they should just do that and not invite a discussion about unmeasurable risks that can easily be co-opted by those eager to renew nuclear testing programmes, resist doctrinal changes or advance nuclear modernization efforts. It should also be noted that some of the most significant nuclear arms control and disarmament measures that have ever been reached, such as the 1987 Intermediate Range-Nuclear Forces (INF) Treaty, came about on the back of periods of acute hostility and tension.⁸⁵ Finally, those involved in the debate should be wary of allowing policy dialogue to grow too narrow. Confining discussions to modest managerial adjustments risks narrowing the gamut of policy options deemed feasible by future policy-makers.

Contrary to what its proponents often claim, the risk reduction agenda is severely circumscribed by the putative requirements of nuclear deterrence. Deterrence practices, after all, are necessarily 'risky', as the credibility of nuclear deterrence, in particular extended nuclear deterrence, depends on 'threats that leave something to chance', i.e. the deliberate maintenance of nuclear risk. Accordingly, the notion that 'all States—irrespective of their stances on nuclear weapons—share an interest in the urgent pursuit and implementation of measures to reduce the risk of use' is not particularly meaningful.⁸⁶ States that have based their security on nuclear deterrence have an interest in maintaining the risk of use. The underlying bet, of course, is that the risk of retaliation and ensuing nuclear escalation helps suppress the risk of straightforward (nuclear) aggression.

In the late 1980s, former US National Security Advisor McGeorge Bundy argued that it was 'a mathematical law' that 'if you keep reducing the risk, your chance of durable safety can be very good'. For example, 'if the overall chance of general nuclear disaster per decade was one in fifty in the decade of the sixties ... and if it is one in two hundred two decades later, if we can make it one in eight hundred for the first decade of the twenty-first century and so on after that, the chance of permanent escape will be 99 percent'.⁸⁷ If this sounded too good to be true it probably was. As Bundy added in a cautionary footnote: 'I am warned by my tutors that such formulas are indicators of possibilities, not predictors.'⁸⁸ Around the same time that Bundy was writing his book, the author privately conceded to the historian Martin Sherwin that 'crisis managers cannot manage everything ... and that's where luck comes in.'⁸⁹

⁸⁵ Benoît Pelopidas, 'A bet portrayed as a certainty: reassessing the added deterrent value of nuclear weapons', in George P. Shultz and James E. Goodby, eds, *The war that must never be fought: resolving the nuclear dilemma* (Stanford, CA: Hoover Press, 2015), p. 51.

⁸⁶ Renata Dwan, 'Foreword', in Wan, ed., *Nuclear risk reduction: closing pathways to use*, p. xv.

⁸⁷ Bundy, *Danger and survival*, p. 616.

⁸⁸ Bundy, *Danger and survival*, fn 18 p. 702.

⁸⁹ Sherwin, *Gambling with Armageddon*, p. 465.