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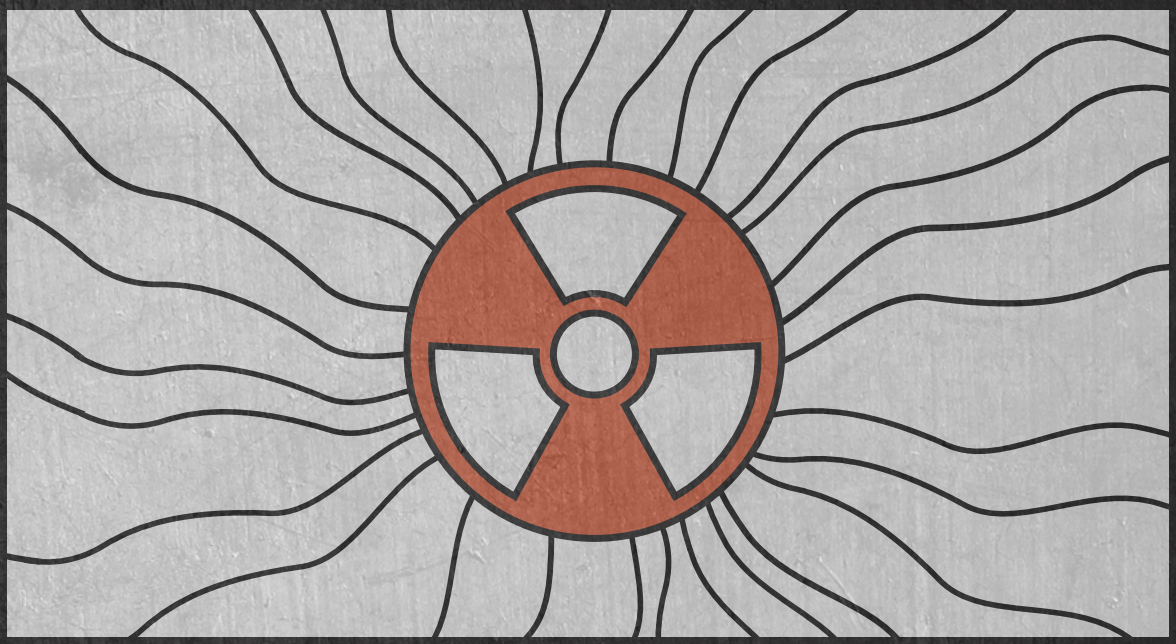
PAPER FIVE

REVITALIZING PURSUIT OF NUCLEAR DISARMAMENT



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LIST OF ACRONYMS

ABM Treaty	Anti-Ballistic Missile Treaty
AI	artificial intelligence
CTBT	Comprehensive Nuclear-Test-Ban Treaty
ICBM	intercontinental ballistic missile
MAD	mutually assured destruction
NATO	North Atlantic Treaty Organization
New START	New Strategic Arms Reduction Treaty
NNWS	NPT non-nuclear-weapon States
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NWS	NPT nuclear-weapon States
TPNW	Treaty on the Prohibition of Nuclear Weapons

FOREWORD

In July 2020, UNIDIR initiated the Disarmament, Deterrence, and Strategic Arms Control (DDAC) Dialogue. This initiative has brought a diverse group of policymakers and experts from States, academia and think tanks into contact on a not-for-attribution basis to examine how arms control and disarmament efforts can be recrafted in productive ways. One of the Dialogue's objectives is to explore how to revitalize pursuit of nuclear disarmament. This paper, written by Rakesh Sood, a commentator and former senior disarmament practitioner, aims to stimulate thinking and offer practical suggestions on ways to achieve that goal. The paper helped stimulate a fruitful discussion in February 2021 in a meeting in virtual space on this topic among the Dialogue's participants. It is published here, along with commentaries from other DDAC participants, to be of use to a broader audience.

The starting point for February's DDAC discussion was a recognition that today's continued reliance on nuclear deterrence, as Sood notes, provides both the backdrop and the motivation for revitalized pursuit of nuclear disarmament. It provides the backdrop because the goal of elimination of nuclear weapons is not immediately achievable. It provides the motivation because inherent in the existence of nuclear weapons is some non-zero possibility of their use in a catastrophic breakdown of nuclear deterrence. The danger of such a breakdown, moreover, is heightened by the greater complexity of today's deterrence relationships, a theme discussed in both this paper's exploration of the evolution of deterrence and throughout the DDAC dialogue.

Cooperation also is essential to revitalize pursuit of a nuclear-weapon free world.

Renewed cooperation among States to recraft strategic arms control along the lines discussed in other parts of the DDAC dialogue can help to reduce the risks of a nuclear deterrence breakdown—but it is not sufficient given those very risks. Cooperation also is essential to revitalize pursuit of a nuclear-weapon free world. Sood examines the political underpinnings of nuclear deterrence, its limitations in today's times, and proposes the concept of Deterrence 3.0 as a stepping stone to lowering nuclear risks.

However, as Sood's paper also emphasizes, restoring such cooperation requires rebuilding dialogue at many levels and among many States and their experts. We also need, in his words, to stop thinking in binary terms—disarmament versus deterrence, supporters of the new Treaty on the Prohibition of Nuclear Weapons versus its opponents, or dependents on nuclear deterrence for security versus rejectionists of nuclear deterrence. In turn, Sood's call should be heeded: that alongside familiar roles and identities, we each should also consider our responsibilities as global citizens in confronting the threat to human security if nuclear weapons ever are used.

Sustaining the non-use of nuclear weapons is the goal put forward at the core of Sood's paper. He rightly sees a shared interest in preventing nuclear use as providing a critical foundation for dialogue and cooperation. It also will be an initial test. The norm of 75 years of nuclear non-use is under stress today, not least because of the eroding geopolitical/security context, complex deterrence relationships, and reassessment by some States of the manageability and consequences of limited use of nuclear weapons in an escalating conventional conflict.

One important action to strengthen non-use would be for all nuclear-armed States to affirm the Reagan–Gorbachev principle that a nuclear war cannot be won and must never be fought.

Another is to enhance 'P5' engagement to identify and implement actionable steps to reduce nuclear risks. Sood's paper proposes still other specific actions, from adoption of no-first-use of nuclear weapons policies to ensuring effective command and control of nuclear weapons. Even those readers who disagree with his proposals should share his call for cooperative actions to sustain nuclear non-use.

Given the possibility of nuclear deterrence breaking down, sustaining non-use of nuclear weapons needs to be part of a more comprehensive pursuit of nuclear disarmament. On this, more ambition is needed. Here, the discussion at the February DDAC meeting offers important insights that complement the paper's analysis. Three broad pathways for revitalized pursuit of nuclear disarmament stand out. First, reliance on nuclear weapons should be reduced and the roles and the circumstances in which such weapons might be threatened or employed narrowed. Second, it will be essential over time to change policymakers' thinking about necessity, utility, legitimacy, and acceptability of nuclear weapons, which requires overcoming various assumptions and assessments that have become deeply embedded among some strategic elites. Third, and connected to this, given questions about the relative uncertainties and risks of a world without nuclear weapons (compared to today's world), there is a need to address those perceived risks and uncertainties. Several of the comments appended to this paper speak to aspects of these pathways.

Across these three pathways, *which* specific actions to take, *when* and to *what* benchmarks in terms of transparency and verification, for instance, are and will almost certainly remain a subject of intense debate among experts and national decision makers. This paper and the accompanying comments by other participants in the UNIDIR dialogue—as well as the broader DDAC dialogue—suggest ways of thinking about such actions. The most important rule of thumb, however, always should be whether actions being taken—whether related to deterrence or disarmament—advance States closer to the goal of a nuclear-weapon-free world or set back progress.

This paper complements four earlier papers in the Dialogue that UNIDIR published in its nuclear dialogue series since mid-2020 (these are listed at the end of this publication). Like the earlier papers, this paper is an exploratory, not comprehensive, treatment of the themes by the author. It should also be noted that the comments on this paper, reproduced at the end of each, were informal contributions that respond to earlier drafts rather than the latest, published versions. Nevertheless, these comments are included because they contain valuable insights into ways to address the dilemmas of nuclear weapons at the current time, including the breadth of perspectives involved.

John Borrie Lewis A. Dunn Wilfred Wan

WHY NUCLEAR DISARMAMENT?

The nuclear age began on 16 July 1945 when the United States successfully conducted the Trinity test, exploding a plutonium implosion fission device. Weeks later, the entire world was stunned by the enormous destructiveness of these weapons when the United States dropped the Little Boy atomic bomb (a highly enriched uranium gun-type fission device) on Hiroshima, following with the dropping of the Fat Man bomb (similar to the Trinity device) on Nagasaki. The two cities were flattened, killing between 150,000 and 246,000 people. That was 75 years ago. In the following years, the United States, the Soviet Union, and other States tested thermonuclear devices with explosive yields hundreds of times greater.

This year, 2021, has witnessed the entry into force of the Treaty on the Prohibition of Nuclear Weapons (TPNW or Ban Treaty) on 22 January. The Ban Treaty is the first multilateral treaty addressing nuclear weapons, 50 years after the Non-Proliferation Treaty (NPT) entered into force.

At much the same time, the United States and the Russian Federation exchanged diplomatic notes on 25 January to extend the bilateral New START agreement by five years. Today, that treaty is the only bilateral nuclear arms control treaty between the two States, constraining a new nuclear arms race of the kind that was seen during the Cold War. There were well-founded concerns that a Trump victory in the November 2020 US election would have allowed it to lapse.

In 1947, a group of nuclear scientists, associated with the Manhattan project that developed the atomic bomb, created the Doomsday Clock to show how close the world is to nuclear annihilation. In 2007, the concept was widened to a 'global catastrophe' in view of the growing concerns about climate change. An advisory board, consisting of eminent scientists from across the world, monitors developments and sets the clock every January. In 1947, it stood at seven minutes to midnight, was pushed forward to three minutes to midnight in 1949 when the Soviet Union tested a fission device (successfully catalyzing the nuclear arms race), and fell back to 17 minutes to midnight when the Cold War ended in 1991. Since January 2020 the Doomsday Clock has stood at 100 seconds to midnight, the closest it has ever been.[1]

Concerns about nuclear weapons have been at the core of the work of the United Nations since the organization's creation in the aftermath of the Second World War. The objective of the first United Nations resolution adopted by consensus on 24 January 1946 at the first General Assembly session was "the elimination from national armaments of atomic weapons and all other major weapons adaptable to mass destruction".[2] That goal has not been achieved. We have, however, successfully navigated the last 75 years without witnessing another use of nuclear weapons. Can we manage the next 75 years equally successfully? If the answer is that it is unlikely, then, given the collective stakes, we need to ask ourselves what must change. How do we design policies and collectively negotiate instruments that will enable us to avoid the use of nuclear weapons and achieve the objectives that the international community adopted in United Nations resolution 1(1)?

1 The 2021 Doomsday Clock Statement by the Science and Security Board of the Bulletin of Atomic Scientists, https://thebulletin.org/doomsday-clock/current-time/

2 General Assembly resolution 1(1), https://undocs.org/en/A/RES/1(I).

APPROACHING THE ISSUE

The two key phrases in the title of this paper are "revitalizing pursuit" and "nuclear disarmament". Nuclear disarmament is taken to mean elimination of all nuclear weapons, or a nuclear-weapon-free world. This definition reflects the International Court of Justice Advisory Opinion in 1996 that affirms by consensus that "there exists an obligation to pursue in good faith and bring to a conclusion negotiation leading to nuclear disarmament in all its aspects under strict and effective international control". The construction of article VI of the 1968 NPT and the various United Nations resolutions on this issue, beginning with the first one, read together with other parts of the opinion, describe the final objective as elimination of nuclear weapons.[3]

The second phrase "revitalizing pursuit" is taken to mean looking for steps that can provide some momentum in moving towards the objective. It would be wonderful if we had or could agree on a complete road map to a world without nuclear weapons. Indeed, there have been multiple proposals advocating a phased approach and setting out the necessary sequential steps phase wise that would lead to the objective of a nuclear weapon free world. However, these proposals have not found much acceptance. Thus, we are in uncharted territory.

Over the decades since 1945, moreover, some of the choices made did not take the world in the right direction, although some of them may have helped in achieving other goals such as preventing the use or curbing the spread of nuclear weapons. At the same time, a new terminology took shape to describe the dynamics of nuclear deterrence. "Revitalizing pursuit" therefore also requires that we understand how this terminology of deterrence has evolved, and its political backdrop, over the last 75 years.

Revitalizing pursuit also means addressing the legal gap regarding the nuclear weapons that do exist, as also stated in the 1996 International Court of Justice advisory opinion. New legal measures, arrived at through dialogue and negotiations, must be identified, and pursued. Use of nuclear weapons might create a shock that could galvanize the States into decisive action. But this type of analysis under the aegis of the United Nations would only consider waiting for such a shock as impossibly radical and dangerous.

New legal measures, arrived at through dialogue and negotiations, must be identified, and pursued.

FINDING A WAY FORWARD

As we think about a way forward, the steps in "revitalizing pursuit" also need to be pragmatic. We need to accept the political reality that the slate cannot be wiped clean to enable a fresh start. This means retaining the building blocks that have been used to construct the nuclear order as it exists, but also looking beyond what it has achieved to identify new steps to advance the goal of "nuclear disarmament".

In response to this call for new steps some persons may argue that the existing building blocks have prevented the use of nuclear weapons since 1945. The spread of nuclear weapons also has been limited to only nine States (China, the Democratic People's Republic of Korea, France, India, Israel, Pakistan, the Russian Federation, the United Kingdom, and the United States), far fewer than the number it could have been. In turn, the total number of nuclear weapons has come down from a high of approximately 70,000 to around 15,000, which is a

3 Legality of the Threat or Use of Nuclear Weapons, https://www.icj-cij.org/en/case/95.

significant reduction by any measure. This line of reasoning would imply that we have been on the right track. But that judgment hardly squares with today's disarmament stalemate or with the Doomsday Clock assessment of the danger of nuclear catastrophe, one that is widely shared. Moreover, while it stands to reason that the existing building blocks have helped, it may also be argued that there has also been more than a fair share of good luck that has enabled us to navigate the first 75 years without a nuclear catastrophe.

More broadly, in the absence of an agreed and clearly visible step-by-step sequential approach to achieving a world without nuclear weapons, our situation is a little like that of a mountaineer who can see the summit but since the route is not mapped, has to work out the path gradually as they progress towards the end objective. All the while, that mountaineer must take care to avoid pitfalls, cracks, and crevasses. Therefore, while the steps proposed in this paper may appear to some readers as not being sufficiently ambitious, they should regard these as measures designed to help revitalize the disarmament process at the present moment. As progress is registered, they will create the political environment to reveal additional steps that become visible and feasible. This type of incremental approach with its emphasis on always moving in the right direction with an eye on the goal of a world without nuclear weapons also helps in preserving the progress made. It is consistent, as well, with the approach outlined in an earlier paragraph about keeping the building blocks developed so far because in politics, unless there is a revolution or a world war, we seldom get a clean slate.

THINKING AS GLOBAL CITIZENS

The cumulative political and legal deliberations of past years suggest three fundamental axioms. First, as long as some States retain nuclear weapons others will have a justification to acquire them. Second, while nuclear weapons exist the likelihood of their use, deliberate or accidental, cannot be completely discounted. Third, any use of nuclear weapons would be catastrophic. These axioms encourage thinking about the issue from the perspective of global citizens and not as citizens of nuclear dependents (those States that rely on nuclear weapons for security) or nuclear rejectionists (those States that believe in immediate abolition). Doing so also entails trying to overcome differences and seek ways to advance the interest shared by all States in avoiding a nuclear catastrophe and moving towards a world without nuclear weapons. Doing so requires a change of thinking on all sides.

Specifically, with the emphasis on the humanitarian impact of any use of nuclear weapons, the 'humanitarian initiative' gathering steam in recent years, and now the TPNW entering into force, the nuclear debate has been polarized. Such a division inhibits dialogue. Equally, it creates an impasse. Positions harden along lines that make finding common ground impossible—as between those States and experts who insist that nuclear weapons have maintained peace and those who insist that nuclear weapons are immoral. Nuclear dependents have convinced themselves that living with the perpetual threat of annihilation is the only way to survive. Conversely, the nuclear rejectionists consider that their assessment of global nuclear risks is not merely based on moral and ethical considerations arising out of the humanitarian consequences of use of nuclear weapons but on equally valid and pertinent security considerations because of those consequences.

The fact that nuclear weapons have not been used for 75 years has created a conviction (among some) that the policies adopted have been morally and politically right, notwithstanding the near crises that took place.[4] This conviction creates a reluctance to re-examine

4 Nuclear close calls have been documented by Eric Schlosser in *Command and Control: Nuclear Weapons, the Damascus Accident and the Illusion of Safety* (2013); Chatham House in its report, *Too Close For Comfort* (2014), https://www.chathamhouse.org/2014/04/too-close-comfort-cases-near-nuclear-use-and-options-policy; and the Union of Concerned Scientists,

the theories of arms control, deterrence, and non-proliferation, leading to a widening gap between nuclear dependents and rejectionists. Perhaps, if we think as global citizens, we can begin to overcome this reluctance to undertake an objective analysis of nuclear deterrence and nuclear stability during the last 75 years. By finding ways to cooperate across today's divides, we may—like our mountaineer—move steadily in the direction of a world free of nuclear weapons and the threat of nuclear catastrophe for all.

"Close Calls with Nuclear Weapons" (2015), https://www.ucsusa.org/resources/close-calls-nuclear-weapons.

THE WORLD OF DETERRENCE 1.0

We now turn to nuclear deterrence, which can be seen to have evolved in three identifiable phases. Those phases are now described as they are relevant to this paper's central arguments.

The nuclear age began in 1945 with the first invention and use of atomic weapons by the United States. By 1949, its rival the Soviet Union had tested its first nuclear device. The same year, the North Atlantic Treaty Organization (NATO) was born, an alliance of United States, Canada, and most States of western Europe. An ideological rivalry emerged that was to shape global politics for the next four decades.

Deterrence 1.0 in response to nuclear rivalry was defined by the ensuing Cold War. It was essentially a two-player game. Even though the United Kingdom, France and China became nuclear powers in the following decade-and-a-half, their arsenals remained much smaller and never factored into Soviet–US arms control negotiations, which remained bilateral. Both the United States and the Soviet Union found this convenient as it cemented their status as nuclear superpowers, enhanced their standing in their respective alliances (the Soviet-led Warsaw Pact came into being in 1953), and excluded the United Kingdom and France from any arms control obligations. Incidentally, the same argument of 'a much smaller arsenal compared to the big two' has been used by China in later years to resist pressure that it become involved in arms control talks.

US–SOVIET ARMS CONTROL AND NON-PROLIFERATION COOPERATION

The United States and the Soviet Union both faced existential threats from each other's nuclear forces. This reality was driven home by the Cuban missile crisis in 1962. There was a growing realization that in a bipolar world of two nuclear superpowers, 'strategic stability' meant 'nuclear stability'. This understanding underwrote nuclear deterrence during the Cold War. As Albert Wohlstetter wrote, strategic stability between the United States and the Soviet Union rested on assured capability to retaliate if the other State struck first with nuclear weapons.[5] Accepting mutual vulnerability was one of the keys to the structure of US–Soviet nuclear arms control, leading to acronyms like MAD (Mutually Assured Destruction) and the evocative image of two scorpions circling each other in a bottle. The acceptance of 'mutual vulnerability' led to the conclusion of the Anti-Ballistic Missile (ABM) Treaty in 1972 under which both States limited their missile defence systems and accepted that they were mutual hostages.

There was a growing realization that in a bipolar world of two nuclear superpowers, 'strategic stability' meant 'nuclear stability'.

In this world of Deterrence 1.0, the United States and the Soviet Union still engaged in a race to pursue quantitative and qualitative superiority, to create negotiating leverage and hedge against future technological breakthroughs. While the US arsenal peaked in the 1970s and the Soviet arsenal in the 1980s, the fact that these arsenals were so bloated enabled both States to engage in initially establishing limits and then undertaking gradual reductions beginning with the Strategic Arms Limitation Treaty (SALT I) signed in 1972 and continuing on to Strategic Arms Reduction Treaty (START) that entered into force in 1994. Central to bilateral arms control, with its focus on numerical limits, was the concept of parity between US and

5 Albert Wohlstetter's *The Delicate Balance of Terror* (1958) was seminal in shaping US understanding of nuclear deterrence, https://doi.org/10.7249/P1472.

Soviet nuclear capabilities. The arms race continued.[6]

Along with bilateral arms control, both the United States and the Soviet Union also shared the objective of preventing further nuclear proliferation. This convergence helped to create the NPT in 1968. That treaty divided States into two categories. There were five States with nuclear weapons that had exploded such a device before 1 January 1967, and the rest that had to forswear their right to acquire nuclear weapons when they joined. The NPT had two other aspects—promoting international cooperation in peaceful applications of nuclear science and technology, and a commitment to undertake negotiations leading to an end of the nuclear arms race and nuclear disarmament. However, at its core, the NPT was based on one premise: the more States that have nuclear weapons, the greater the likelihood of use of nuclear weapons. So, limiting their spread is key to preventing nuclear catastrophe. Decades later, part of the momentum behind the TPNW arose from the frustration of many NPT non-nuclear-weapon States that the NPT appears unable to move forward on its disarmament obligation. In terms of the single premise of preventing proliferation to prevent use, however, the NPT has reached the limits of its success.

DETERRENCE 1.0—AN ASSESSMENT

Deterrence, arms control, crisis management and non-proliferation defined the nuclear order during the Cold War. Parity and mutual vulnerability ensured stability in mutual nuclear deterrence. Arms control sought to manage the arms race and ensure arms race stability so that competitive acquisition of nuclear weapons did not threaten deterrence stability. The need for crisis management had been driven home with the Cuban missile crisis. It led to the establishment of a US–Soviet hotline for reliable communications and gradually a more cooperative mode took hold in the development of nuclear risk reduction measures. Crisis management was designed to prevent escalation and maintain the nuclear/conventional firebreak. Deterrence by denial of the adversary's objectives buttressed deterrence by punishment to reduce the risk of any conflict and help ensure that limited nuclear use did not happen. Even so, the military planners kept up with their nuclear war games.

A central dilemma of nuclear deterrence emerged in this world of Deterrence 1.0. The basic tension is that there is inherent risk in preparing for nuclear war as a way to prevent it. To circumvent this dilemma, risk reduction proposals took shape even as arsenals kept growing with large parts of the arsenals on hair trigger alert. For example, one way to partially resolve this dilemma would have been if both the United States and the Soviet Union had adopted policies of no-first-use of nuclear weapons and postures consistent with these. However, for the United States, its policy of extending a nuclear umbrella to its allies—so-called 'extended deterrence'—made that policy shift difficult. More recently, the Russian Federation has rejected a no-first-use policy because of its stated concerns about NATO's conventional superiority. Preparing for nuclear war to prevent nuclear war also meant the question of whether nuclear weapons are qualitatively different, or simply part of a larger continuum of military violence, could never be resolved. As a result, both the United States and the Soviet Union pursued options for nuclear warfighting, counterforce and planned to prevail at different rungs of a posited ladder of nuclear escalation.

6 Niall McCarthy, "How U.S. and Russian Nuclear Arsenals Evolved" (2020), https://www.statista.com/chart/16305/stockpiled-nuclear-warhead-count/.

THE WORLD OF DETERRENCE 2.0

The Cold War ended with the fall of the Berlin Wall in 1989. The Soviet Union broke apart two years later. The world of Deterrence 1.0 was gone. The United States was the sole superpower and now faced no existential threat. Deterrence 2.0 defined the post-Cold War period spanning two decades.

PROGRESS IN NUCLEAR ARMS CONTROL

Nuclear bipolarity continued for purposes of arms control, which remained the Russian Federation's only claim to superpower status. However, the nuclear arms race slowed down. The changed politics of the post-Cold War period ensured both crisis stability and deterrence stability. The nuclear agenda was driven largely by the United States. The Russian Federation and the United States still converged on the need to curb any proliferation and the two worked together to ensure that Belarus, Kazakhstan, and Ukraine, which had emerged as post-Soviet independent States and possessed some former-Soviet nuclear capabilities and facilities, were denuclearized. In 1995, the NPT was extended in perpetuity. Nuclear testing ended and the Comprehensive Nuclear-Test-Ban Treaty (CTBT) was opened for signature in 1996, although today its entry into force remains pending. The New START agreement in 2010 became the last arms control achievement of this period, thanks to US President Obama's determination to create a safer nuclear world and Russian readiness to set aside their concerns over US missile defences. Apparently, Obama also contemplated US adoption of a nuclear no-first-use policy but was dissuaded to enact this by the Pentagon.[7] US efforts to reduce the salience of nuclear weapons by a process of substituting conventional for nuclear weapons in some missions included developing conventional prompt global strike capabilities. But these developments raised concerns in China and the Russian Federation, both of which had, by then, embarked on their own nuclear modernization programmes.

During this period, the Al-Qaida attacks of 11 September 2001 altered global threat perceptions. Combating global terrorism assumed a new primacy, along with preventing terrorist groups from being able to acquire any capability relating to nuclear weapons or any other weapon of mass destruction. Obama's Nuclear Security Summits were an attempt to promote this agenda.

NEW NUCLEAR POWERS BUT QUESTIONS ABOUT THE UTILITY OF NUCLEAR WEAPONS

Other major developments were the nuclear weapon tests undertaken in 1998 by India and Pakistan and in 2006 by the Democratic People's Republic of Korea. The emergence of three States with nuclear weapons programmes created new realities. (Israel had developed nuclear weapons decades earlier but never publicly acknowledged it, preferring nuclear opacity.) The decisions by India, Pakistan, and the Democratic People's Republic of Korea to test nuclear weapons were the outcome of old long-standing rivalries that were now sharpening. Between India and Pakistan, deterrence concerns were especially in play, but the equation differed from what had guided US and Soviet policy in the world of Deterrence 1.0. India espoused a nuclear doctrine of no-first-use of nuclear weapons; Pakistan threatened early battlefield use of nuclear weapons should Indian conventional forces cross an undefined Pakistan 'red line'. Another major development was the US invasion of Iraq in 2003 on the grounds that its leader, Saddam Hussein, was pursuing a clandestine nuclear weapons programme. The US

7 Obama's Nuclear Posture Review in 2010 also hinted at it but eventually he did not push it through; https://www.defensenews.com/pentagon/2016/10/13/22-us-house-democrats-press-obama-to-adopt-no-first-use-nuclear-weapons-policy/.

claim lacked conviction, ultimately was proven wrong, and irretrievably damaged US credibility and international standing.

Developments during Deterrence 2.0 also raised questions about the utility of nuclear weapons. The idea that nuclear weapons ensure peace between rivals was tested in 1999 when India and Pakistan became embroiled in the Kargil conflict as Pakistan sought to make conventional military gains under its own nuclear umbrella. This was a demonstration in practice of the stability–instability paradox. The limited utility of nuclear weapons also became clear as South Africa dismantled its apartheid regime and the Soviet Union broke up. Nuclear weapons could not prevent dramatic internal changes and it was clear that their security function is not all encompassing. Yet, such is the overhang of belief in the utility of nuclear weapons that many observers still maintain that the Democratic People's Republic of Korea needs its nuclear weapons to ensure regime survival.

During the period defined by Deterrence 2.0, major power rivalry remained muted and the perceived threat of nuclear annihilation distant. Thus, further proliferation of nuclear weapons, the effectiveness of nuclear command and control systems, and safeguarding sensitive nuclear materials remained the principal nuclear risks. Military and civilian scientific and technological developments continued apace, including in the new areas of space and cyberspace. Dual-use technologies and research generated new concerns. As a result, terms like lead-times to a nuclear weapon, nuclear latency, threshold States, and nuclear breakout began to appear more frequently.

TODAY'S MORE COMPLEX WORLD

The world of today is very different from those of Deterrence 1.0 or Deterrence 2.0. Several differences stand out.

Today, major power rivalries have returned. There now are multiple nuclear dyads (US–Russia, US–China, US–DPRK, India–Pakistan, India–China, and potentially more) and more inter-linkages among these dyads. In short, the stand-alone bipolar dyad is no more. This makes today's world one of nuclear multipolarity. Nuclear deterrence has therefore become a multi-body problem.

Nuclear deterrence has therefore become a multi-body problem.

Second, the nuclear arsenals across these dyads reflect multiple asymmetries. Numbers of nuclear weapons vary from one nuclear-armed State to another. Doctrinal approaches also differ because the threats specific States face differ. Different risk tolerances also are evident. Not least, there are also asymmetries between and among today's nuclear-armed States in their overall respective strategic postures (including activities involving advanced conventional weapons, artificial intelligence (AI) as well as in space and cyberspace). As a result of all these developments, nuclear stability between asymmetric nuclear-armed States is more difficult to define or sustain, while overall strategic stability can no longer be equated with only nuclear stability. To add to this, nuclear technology is no longer an esoteric science but a mature, 75-year-old technology. The effect is to create new opportunities for nuclear proliferation.

In today's world, the thinking and approaches reflected in Deterrence 1.0 nor Deterrence 2.0 no longer work. In part, this outcome is because the underlying political premises and relationships that led to these earlier approaches have changed. In that context, old arms control agreements such as the 1972 US–Soviet ABM Treaty and the 1987 US–Soviet Intermediate

Nuclear Forces (INF) Treaty have been jettisoned. Reviving bilateral arms control also seems difficult given US-Russian political confrontation and the spectrum of interwoven issues. Notwithstanding the recent five-year extension of New START, trilateral arms control involving the United States, the Russian Federation and China is not acceptable to China. Multilateral disarmament has gone in the direction of the TPNW as the Geneva-based Conference on Disarmament has remained blocked for more than two decades.

POLARIZATION OF THE NUCLEAR DEBATE

Of even greater importance, a new polarization in the nuclear debate is increasingly evident. Binaries have been created such as arms control versus disarmament, non-proliferation versus disarmament, the TPNW versus the NPT. All the TPNW's supporters are party to the NPT in good standing. Yet, their actions are apparently seen by some other NPT States, especially the five nuclear-weapon States, as weakening the NPT. The focus on the humanitarian consequences of use of nuclear weapons, the 'humanitarian initiative', has revived the old question of whether nuclear weapons are qualitatively different, and the TPNW's supporters have answered it in the affirmative. In their view, because the NPT de-legitimized nuclear proliferation but not nuclear weapons, that treaty successfully delivered only on its goal of preventing the spread of nuclear weapons. The NPT nuclear-weapon States have used the NPT to confer a legitimacy on themselves, instead of meaningfully addressing their article VI nuclear disarmament obligations. The result has been a sense among many NPT non-nuclear-weapon States of alienation and resulting disquiet. This has stymied dialogue.

How do we overcome these binaries and resume dialogue? An answer to this question is vital if we are to move ahead cooperatively to revitalize pursuit of nuclear disarmament and avoid a nuclear catastrophe.

THE NEED FOR DETERRENCE 3.0

We need to return to basics because today's political reality has changed from the worlds that defined Deterrence 1.0 and Deterrence 2.0. The previous nuclear orders were the outcome of a certain political reality. To craft a new nuclear order, Deterrence 3.0 needs to be designed for a multipolar nuclear world. Given the dangers of a nuclear catastrophe, it has to offer a response to that threat. It also needs to promise a way to reduce today's polarization.

However, we do not have the luxury of wiping the slate clean. Just as Deterrence 2.0 did not start from scratch but rather built upon Deterrence 1.0, Deterrence 3.0 will also build upon what exists. Crafting Deterrence 2.0 was simpler because it reflected a brief unipolar moment for the United States. The United States had also been the one of the architects of Deterrence 1.0, together with the Soviet Union, in a bipolar world. Today's world is more complex and while the United States and the Russian Federation retain over 90 per cent of global nuclear arsenals, they no longer enjoy the same political clout they possessed during the Cold War. Other States with nuclear weapons will also demand roles, although the lead will still be with the United States and the Russian Federation.[8]

SOME QUESTIONS TO SHAPE OUR THINKING ABOUT DETERRENCE 3.0

To better understand what has changed, we need to ask ourselves certain questions. We may not find answers to all of them now, or at least not in a manner that will gain universal acceptability. It is possible that Deterrence 3.0 may only take us part of the way towards the final objective of a nuclear-weapon-free world. But if it helps revitalize the dialogue among States and experts in pursuit of nuclear disarmament, it would have been an important step forward, for the mountaineer moving slowly but steadily towards the summit.

Our understanding of nuclear deterrence is derived from the stand-alone US–Soviet/Russian nuclear dyad. Today, as already suggested, there are multiple dyads, but some are loosely linked together in a manner not entirely evident. Among the questions that arise are the following. Does reducing each rivalry relationship to a dyad create a political over-simplification, and if so, what are the limits to the utility of such a construct? In a nuclear chain, however loosely linked, with rivalries in very different geographies, not separated by oceans, does the distinction between countervalue and counterforce hold? And if not, what does an escalatory ladder look like?

In turn, in the bipolar world, mutual vulnerability and parity were the basis of imparting stability to nuclear deterrence. But in a multipolar nuclear world, of inter-linked dyads, characterized by an asymmetry in terms of the sizes and nature of nuclear arsenals, how do we visualize ensuring deterrence stability? And in an asymmetric situation, how do we manage the nuclear arms race when States at the lower end of the technology spectrum will seek to keep advancing to catch up?

One possible basis for moving forward is agreement among all the States possessing nuclear weapons on a new approach to nuclear deterrence stability and on the need to prevent the use of nuclear weapons. Part of such agreement is the need consequently to prevent a crisis from escalating to the nuclear level. Thus, crisis management stability is the only aspect of nuclear deterrence stability from Deterrence 1.0 and 2.0 that still holds. Other aspects of

8 Hans Kristensen and Matt Korda, "Status of World Nuclear Forces", *Federation of American Scientists* (2021), https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/.

deterrence stability for today's world, including how to address the broader challenges to nuclear stability from other areas, demand further consideration.

Looking back to the origins of nuclear arms control between United States and Soviet Union/Russian Federation also offers a possible way forward in thinking about Deterrence 3.0 and bears on the overall question of revitalizing pursuit of nuclear disarmament. Nuclear arms control was an integral part of Deterrence 1.0 and 2.0. But we see in hindsight that nuclear arms control was not—and could not be—enough to achieve nuclear elimination. At the time, Thomas Schelling and Morton Halperin famously defined arms control as "all 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".[9] It is worth noting that this definition does not include disarmament but does visualize the failure of deterrence and the need to prepare for it. But does arms control prepare us for a global existential nuclear threat when the issue of deterrence gets redefined in a multipolar nuclear world? Should we continue to believe that when we look into the abyss, the fear it engenders will ensure that we collectively turn back, every time? Implicit in these questions is a recognition that nuclear arms control alone cannot be the core of Deterrence 3.0.

A recognition of the other military and political changes underway also helps to shape thinking about Deterrence 3.0. As already suggested, developments in a range of other technologies like AI, quantum computing and offensive cyber capabilities all have a bearing on nuclear postures and hence nuclear risks. New developments in advanced weapons like hypersonic boost-glide vehicles and hypersonic cruise missiles, high-energy lasers and stealthy autonomous systems, may offer additional strategic capability and have strategic implications.

A question that often arises with such developments is how long the first mover retains advantage. That may also depend on how visible the development is: hypersonic delivery systems or missile defences become quickly visible to the adversary as these systems need to be tested. On the other hand, AI or cyber capabilities may not become visible until already deployed. At that stage, questions arise about attribution and interpretation, of whether use of such capabilities is for intelligence gathering or in preparation for a first strike. Many of these developments also have a bearing on decision-making time frames that would become compressed. AI systems would create pressure for quick decisions by creating interactive loops. The blurring of the line between use of nuclear and conventional weapons due to the deployment of dual-capable systems, often described as 'entanglement', multiply the risks of system failures that have the potential of leading to unintended escalation.

They also make clear that strategic stability can no longer be equated with nuclear stability.

All these factors add new dimensions of complexity to deterrence stability. They also make clear that strategic stability can no longer be equated with nuclear stability.

This brings us to two final questions, of how to think about Deterrence 3.0, and how to define the success of our ability to navigate the next 75 years of the nuclear age. The end objective of pursuing nuclear disarmament is a nuclear-weapon-free world. But since the path towards it is not a linear process (politics never is), should we define success in stages so that we can progressively build upon what we achieve as well as re-assess our ability to keep moving in the direction of a nuclear free world? Moreover, as we seek to

9 *Strategy and Arms Control* (Thomas C. Schelling and Morton H. Halperin, 1961) has shaped nuclear deterrence thinking for over 50 years. Its continuing relevance is evident in https://www.armscontrolwonk.com/archive/1207805/heroes-of-arms-control-tom-schelling-and-mort-halperin/.

define success, how must we take into account the more immediate challenge that in some doctrinal pronouncements, there is a discernible growing prominence to nuclear warfighting. If this trend gathers momentum amid political confrontation among nuclear-armed States, it will make nuclear use more likely. Even if it does not, the threat of escalation for reasons already discussed is growing. It is this assessment that has led the scientists advisory board to conclude that the Doomsday Clock stands at a vertiginous 100 seconds to apocalypse. From this perspective, assured survival would, at the very least, demand a mitigation of the threat of nuclear annihilation.

ELEMENTS OF DETERRENCE 3.0

Deterrence 3.0 begins with a recognition that dialogue is frozen because of the polarization generated by creating binaries. Deterrence 3.0 is intended to rekindle dialogue by emphasizing the importance of taking the perspective of global citizens. It also recognizes that because we will not be able to instantly convince the nuclear dependents that they are actually safer without nuclear weapons, nuclear weapons cannot be wished away. For the present, the world's nations will still have to live with nuclear weapons—but do so in a manner that both mitigates the threat of nuclear annihilation and ensures the threat is not perpetual.

SUSTAINING THE NUCLEAR TABOO

The initial challenge is therefore to extend the informal taboo against nuclear weapon use that has lasted 75 years, while continuing to expose the limitations of nuclear deterrence. So, sustaining nuclear non-use in Deterrence 3.0 means moving away from the notion that the best way to prevent nuclear war is to prepare for one; such a shift would use non-nuclear technologies where we can and encourage political shifts to mitigate outstanding conflicts when the ground reality permits it. Other more specific ways to strengthen nuclear non-use are discussed below.

A strong point of convergence is preventing any use of nuclear weapons.

Deterrence 3.0 also means not beginning with the abolition agenda front and centre. In the face of current political reality, the existing framework of arms control, crisis management, non-proliferation and nuclear security structured around Deterrence 1.0 and 2.0 needs to be retained, even while accepting its limits. Despite the inherent tension between the nuclear dependents and nuclear rejectionists, a strong point of convergence is preventing any use of nuclear weapons. From this flows the possibility of cooperation in the limited areas of risk reduction, transparency, confidence-building and reducing salience of nuclear weapons where cooperative measures can be explored.

However, the nuclear dependents will join only if they think this agenda is not the beginning of a slippery slope that will make them vulnerable. Conversely, the nuclear rejectionists must understand that limited cooperation is not betraying the ideal goal of a nuclear-weapon-free world. The humanitarian initiative and the resulting TPNW have raised awareness about nuclear weapon risks (including constituting a reminder to the States possessing nuclear weapons). These initiatives also have begun the process of delegitimizing nuclear weapons, which is a key first step towards the elimination of nuclear weapons.

SOME SPECIFIC WAYS FORWARD

The 2016 United Nations Open-Ended Working Group on Taking Forward Multilateral Disarmament Negotiations listed 17 possible measures for reducing the risks of accidental, mistaken, unauthorized or unintentional nuclear weapons detonation as a step forward towards the eventual goal.[10] Deterrence 3.0 is intended to promote a fact-based discourse leading to cooperative actions on such measures, something that has been lacking in recent times.

In addition, as part of Deterrence 3.0, there are other steps identifiable to priorities the nuclear taboo's reinforcement. Examples include reducing numbers of weapons where possible to lower levels (which is why extension of New START is a positive development, as a foundation); removing temptation for first strike; getting rid of ground-based missiles where

10 UN document A/71/371 (1 September 2016), http://undocs.org/A/71/371.

possible because these can be attractive targets (especially in fixed silos) for a first strike when facing adversaries that have advanced surveillance capabilities; persuading a greater number of nuclear-dependent States to accept no-first-use until it evolves into a global non-use norm; limiting the role of nuclear weapons to the 'sole purpose' of deterrence because these weapons do not provide all-encompassing security against internal and external threats; de-alerting of nuclear forces; and, finally, ensuring that command and control mechanisms are deliberative and consultative.

In effect, by pursuing such measures, Deterrence 3.0 accepts the continuing existence of nuclear weapons but pushes the bar for their use ever higher. At the same time, it would seek to expose the limits to deterrence in a multiplayer game arising out of the finite possibility that if nuclear weapons exist, they will be used. In that regard, even as we discuss the legal and moral issues, there can be the enormous destructive aspect of nuclear weapons cannot be disputed. As US President John F. Kennedy said in a speech a few months after the 1962 Cuban Missile Crisis, "For, in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's future. And we are all mortal".[11]

INJECTING THE MORAL DIMENSION INTO OUR DISCOURSE

At the core of the humanitarian initiative is a recognition that the time has come to inject a dose of morality into nuclear discussions. Earlier, Professor Roger Fisher sought to do so in a memorable article "Preventing Nuclear War" in the Bulletin of Atomic Scientists in 1981.[12] He was writing about the US President's absolute authority to order a nuclear strike and the fact that the President is always accompanied by an officer carrying the 'nuclear football' containing the authentication code with which the President identifies himself when ordering the launch. In order to force the President to consider the moral issues before launching a missile strike, Fisher wrote:

> *My suggestion was quite simple: Put that needed code number in a little capsule, and then implant that capsule right next to the heart of a volunteer. The volunteer would carry with him a big, heavy butcher knife as he accompanied the President. If ever the President wanted to fire nuclear weapons, the only way he could do so would be for him first, with his own hands, to kill one human being. The President says, 'George, I'm sorry but tens of millions must die.' He has to look at someone and realize what death is—what an innocent death is. Blood on the White House carpet. Its reality brought home.*

Needless to add, the suggestion horrified the people at the Pentagon, but it did spur discussions on the morality behind using nuclear weapons.

The Fisher article witnessed a revival with the rise in nuclear rhetoric in recent years.[13] This dose of morality may not change positions but will at least help to push both sides to see merit in a dialogue—the necessary, first objective of Deterrence 3.0.

Deterrence 3.0 is more than just initiating dialogue, though. It is qualitatively different from its earlier avatars. It would emphasize actions to ensure and sustain deliberation and consul-

11 President John F. Kennedy's speech on 10 June 1963, https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/american-university-19630610.

12 Fisher, who passed away in 2012, was a professor at Harvard Law School and Director of the Harvard Negotiations Project.

13 Rafi Letzter, "How to Stop Nuclear War with a Butcher Knife and Human Sacrifice", *Inverse*, 9 November 2017, https://www.inverse.com/article/35378-nuclear-war-heart-code-knife-kill-president; and Richard Fisher, "Can Nuclear War be Morally Justified", *BBC Future*, 5 August 2020, https://www.bbc.com/future/article/20200804-can-nuclear-war-ever-be-morally-justified.

tation in command and control mechanisms for use of nuclear weapons. Doing so takes on special importance in light of possible applications of AI in the nuclear realm as well as cyber intrusions in nuclear command and control. The technological changes that have brought about a decoupling between strategic stability and nuclear stability may provide opportunities to move away from hair-trigger alert levels and lengthen the nuclear fuse.

The other qualitative difference is the ideological underpinning of deterrence 3.0 that aims to reduce the salience of nuclear weapons. It aims for something like a gradual weaning away from an addiction because the 'stopping cold turkey' approach is practically not possible (at least not without a catastrophe). The starting point of earlier approaches was deterrence stability whereas in Deterrence 3.0, the starting point is preserving and sustaining the taboo against nuclear use.

WHAT COMES AFTER DETERRENCE 3.0?

During the past 75 years, different approaches towards nuclear disarmament have been presented but have not taken us very far toward the goal of nuclear abolition. Perhaps, these approaches were not ambitious enough, lacked practicality, or the political environment was not conducive to their realization. In any case, the initiatives failed to generate the necessary momentum. Deterrence 3.0 is not intended to last for the next 75 years. Instead, it seeks to make a beginning by devaluing the role of nuclear weapons and highlighting their dangers, while pushing forward the need for a dialogue as global citizens. It is clear today that humanity faces more than just the existential threat posed by nuclear weapons; climate change and pandemics, too, have registered on our collective consciousness. The result will create new coalitions and new initiatives. Negotiations that were once the preserve of sovereign States are giving way to multi-stakeholder deliberations.

It seeks to make a beginning by devaluing the role of nuclear weapons and highlighting their dangers, while pushing forward the need for a dialogue as global citizens.

At some stage, after a few years, we will have to think beyond Deterrence 3.0. That will happen when consensus emerges on the existential threat of nuclear weapons, we begin to think as global citizens, and dialogue becomes a habit. We may then graduate to Nuclear Responsible Status 1.0 in which as our thinking changes, we all accept the reality, feasibility, and desirability of a nuclear-weapon-free world. What we need today are pointers that keep us on the right track and engender confidence that we have not lost sight of the ultimate objective. But to get there, we need to begin a dialogue and Deterrence 3.0 is a modest step in that direction.

A COMPENDIUM OF COMMENTS ON REVITALIZING PURSUIT OF NUCLEAR DISARMAMENT

UNIDIR invited written, informal comments on an advanced draft of Rakesh Sood's paper in advance of a by-invitation online interactive meeting held on 25 February 2021 as part of the Disarmament, Deterrence and Strategic Arms Control Dialogue. The purposes behind inviting these comments were to create a focus on issues of substance in advance of the meeting, kick-start its discussion, and ensure that diverse viewpoints were covered.

As such, the comments that follow are published with permission of the commentators. These were offered in advance of the final version of the published paper, which was expanded and revised in parts to reflect the discussion at the meeting as well as some of this feedback. They are in their original format.

In addition, like the author of the paper, the commentators offered their viewpoints in their own personal capacities and their views as stated here should not be interpreted as necessarily reflecting their official positions or affiliations.

COMMENT BY JOHN BORRIE [1]

Rakesh Sood's piece on Revitalizing Nuclear Disarmament introduces some interesting arguments and concepts. I can get on board with the value of strengthening the taboo against use of nuclear weapons and exposing the limits of nuclear deterrence in a 'multiplayer game'. Despite setting out a case for nuclear disarmament, though, Rakesh settles on what he describes as 'nuclear deterrence 3.0'. I remain sceptical that a situation of nuclear deterrence perceived as more stable by multiple nuclear-armed States will deliver nuclear disarmament. This prompted me to reflect on some other possible pathways.

One pathway to revitalized nuclear disarmament could be characterized as the arms control route. Resumed arms control activity between the United States and the Russian Federation builds trust between them, relieves their strategic tensions, and sparks broader efforts among the nuclear-armed States that result in nuclear weapons ceding importance over time to other capabilities or, better yet, cooperative forms of security that dampen arms racing dynamics between them. Various experts (including Lewis Dunn) have proposed plausible outlines of how this process might look—how nuclear weapons could be increasingly recessed in doctrines and plans to the point that their numbers and alert status are minimized.

Despite the welcome renewal of New START for another five years, it's at best unclear right now how a viable arms control pathway to nuclear disarmament will emerge given US domestic politics (for example, the 67 out of 100 votes for any new arms control treaty required in its Senate) and ongoing difficulties in the relationship between Washington and Moscow, let alone Washington and Beijing. Even if these difficulties are overcome (and I hope they will be), on past form it's not assured that arms control would transcend being a system maintenance activity to achieve real momentum towards a nuclear-free world, something on which I commented earlier in response to the Logic of Arms Control paper. Yet this is the pathway on which we tend to spend the most time and effort in the international security epistemic community.

A second pathway is the sharp shock. Nuclear weapons are detonated in anger, through error, or by accident. Or the world comes so demonstrably close to a nuclear cataclysm for whatever reason that leaders of the nuclear-armed States are likewise sobered to the point they put nuclear disarmament unequivocally on the negotiating table. There are two obvious obstacles obstructing such a pathway. One is that the world might reach the edge of the abyss of nuclear war only to fall in, with catastrophic and perhaps civilization-ending consequences. The other problem is suggested by the experience of the 1962 Cuban Missile Crisis. Rather than create the overriding conviction that nuclear disarmament was the imperative, the conclusion US and Soviet leaders drew even then was that they needed arms control to stabilize their strategic competition and prevent nuclear war.

A further pathway is so narrow that it may apply in only a few cases. Many pro-disarmers predict the great financial costs of the nuclear weapons complex will force some nuclear-armed States out of the game, as it were. They often cite the United Kingdom as a likely candidate when they opine this. But the current of this argument is muddied. Counterarguments are varied. Nuclear weapons may not look so expensive if compared to alternatives (however fancifully defined). Nuclear weapons infrastructure and related capabilities are sunk costs and so capabilities should be maintained because, once ceded, it's unlikely they'll be

1 John Borrie, PhD, is a Senior Resident Fellow at UNIDIR, and an Associate Fellow at Chatham House. The views expressed are his own.

regained. Nuclear weapons convey priceless (read also: intangible) benefits such as influence and prestige.

Then there is the reality that, despite the price tag, several of the nuclear-armed States can handily bear the costs of nuclear weapons into the foreseeable future even if they must curb certain of their more ambitious plans for fiscal reasons. In other words, this pathway to disarmament might be wide enough for a bulldog or even a cockerel, but not for a Eurasian or American bear. And, other factors being equal, that point is enough to tend to discourage the smaller nuclear beasts from taking the path for as long as they can possibly avoid it.

Meanwhile, an abrupt, global financial collapse would be uneven in its effects if it occurred. Given the uncertainties it would create, such a collapse would just as plausibly increase reliance on nuclear weapons for those with them, albeit possibly with lower margins of safety, security and perhaps restraint on their use and threat of use.

Then there's the all-pull-together pathway in which some profoundly serious, exogenous phenomenon incentivizes the world's nuclear-armed States to disarm (or pool their nuclear weapons) or creates a situation in which their nuclear weapons look superfluous or undesirable. As postulated in many books and films, maybe an alien invasion or a revolt of the thinking machines would be enough do it. But the down-to-Earth dangers of climate change, global financial crises and virus pandemics have failed so far to provide such incentive. Even if a 'better' technology is invented that makes nuclear weapons rapidly obsolescent, caution and conservatism will be strong brakes on the rapid elimination of nuclear arsenals. In fact, if recent decades are a guide, we might see a stronger push for alternative missions for nuclear weapons that have little if anything to do with deterrence.

There is one further conceivable pathway I can think of that depends less on speculation about the future than observation of the past and present. One could describe it as the 'mores' pathway (not be confused with Moore's law). It's that sometimes gradually, at other moments in discernible fits and starts—and always in the teeth of countervailing factors—over time nuclear weapons profoundly lose both their lustre and relevance to leaders saddled with managing their risks, soldiers tasked with planning their deployment with/out use, and publics burdened with paying for these genocidal capabilities through their taxes and national debt.

How would this happen? Moving down such a pathway would require both a suitable phenomenological structure and enough directed human agency, that is, advocacy. In other words, it would require the right conditions for the idea of nuclear disarmament, clearly expressed and supported, to resonate. Appropriate conditions would be those in which key existing institutions are in flux and amenable to constructive pressure amplified by incentive structures that compel individual agents to revisit their preferences. That certainly would seem to resemble the age in which we're currently living in many ways. Sood talks of the complexity of inter-nuclear-armed State behaviour in his piece, but the world we live in is not just increasingly complex at the State level. It is not at all far-fetched to believe that tipping points at the social level will affect State behaviour and inter-subjective norms for what is desirable or acceptable and would in fact reflect the experience of some other lasting changes in the world.[2]

Nuclear weapons have a material reality, but they and their associated concepts of deter-

2 See, for example, Adam Hochschild's magisterial *Bury the Chains* (2005) on public campaigning for the end of the trans-Atlantic slave trade and (later) the abolition of slavery. In the weapons field, my own work *Unacceptable Harm* (2010) explores these processes in the context of cluster munitions and anti-personnel mines.

rence and assurance are also constructions of the mind. In that respect, developments like the TPNW are of interest for what they might indicate in terms of what could be bubbling up in terms of attitudes to nuclear weapons. In all pathways, it is difficult to see the actualization of nuclear disarmament bypassing a process of devaluation of nuclear weapons, something unlikely (on form so far) to be spearheaded by the technocrats. (University of York academic Nick Ritchie has written thoughtfully on this in his work on "Valuing and Devaluing Nuclear Weapons".[3]) Of course, the influence of changes in mores will not be uniform, and concerns expressed that the more democratic nuclear-armed States are more vulnerable reflect this.

Other re-framings of weapons have depended on the creation of doubt among policy elites about their value (something that incorporates acceptability as well as utility) and the creation of a plausible alternative in the imagination of the individual. With effective organization and advocacy this plausible alternative can spread and take hold in among the collective. In that respect, the TPNW might serve to accelerate the process toward nuclear disarmament's re-vitalization or create certain tipping points toward it—the verdict is still out. Meanwhile, the 'mores' pathway is not exclusive of other possible pathways, and it acknowledges the complexity of the existence and persistence of nuclear weapons.

The need for creating and nurturing alternatives is at the root of my scepticism about 'deterrence 3.0'. However sensible it sounds, 'safer' or 'more stable' nuclear deterrence is an insufficient stopgap as it does not signal any significant transition in the thinking of the last 75 years of the nuclear age. To transcend the world-weary cynicism that helps to sustain the nuclear order and the "wicked problem" of nuclear weapons (as Patricia Lewis calls it), new inspiration and ways of thinking are required to revitalize nuclear disarmament. This includes awareness of broader currents at work than those we see on the surface in strategic stability-oriented discussions at the elite level. It's hard for us to plumb the depths of those currents, but they too will shape prospects for nuclear weapons into the future.

3 Nick Ritchie (2013), "*Valuing and Devaluing Nuclear Weapons*", *Contemporary Security Policy*, 34:1, 146-173, DOI: 10.1080/13523260.2013.771040

COMMENT BY FAN JISHE [1]

To revitalize pursuit of nuclear disarmament, Ambassador Rakesh Sood proposed that a new nuclear order should be crafted by retaining the existing arms control framework and prioritizing the reinforcement of the nuclear taboo. His paper also briefly addressed the elements for Deterrence 3.0 which could enable us to restart the dialogue on how to prevent the use of nuclear weapons.

Here I want to emphasize that at this critical moment it is more than important to rebuild the balance between rights and obligations for NPT nuclear-weapon States (NWS) and non-nuclear-weapon States (NNWS), and it is the NWS's turn to do more.

Ambassador Sood's three basic principles explain why the NWS and NNWS could achieve the grand bargain in negotiating the NPT. This legal instrument defines the rights and obligations for both, and the rights and obligations for all parties are literally balanced but not balanced in real terms. The obligations of non-proliferation for NNWS are real time and long lasting, while their rights of peaceful use and promise of disarmament by NWS can only be realized through cooperation of NWS in the future.

This subtle balance in text and imbalance in real terms are not a problem at that time, but the gap is widening as time goes by. Obviously out of concern of nuclear proliferation, more restrictions are imposed on peaceful use of nuclear energy, and those States suspected of proliferation activities were punished harshly with economic, political, and diplomatic isolation, and even military attack in some cases. Meanwhile, progress in nuclear disarmament in the past half century is not very satisfactory. The TPNW is a vivid display of the NNWS's unhappiness, complaints, and pressures against the NWS.

What makes things worse is that the nuclear landscape is getting more and more complicated with the collapsing of the existing arms control framework developed in the Cold War era, the introduction of missile defence, the technical breakthroughs in new domains and the challenges it poses to the nuclear relationship, and the inter-connection between the traditional strategic domain and the new domains.

Future development in strategic areas could be very challenging. The existing arms control framework, the grand bargain between the NWS and NNWS, and the disarmament process may not be very satisfactory for either party. But to retain and fix the existing framework is a better option than creating a new one.

How to do this? Now it is about the time for the NWS to do more: to compartmentalize different domains so that nuclear issues might be handled a little bit easier; to negotiate an agreement on the development and deployment of missile defence; to find ways to maintain strategic stability at lower nuclear numbers; to de-alert nuclear arsenals; to limit the role that nuclear weapons play in national security strategy to its sole purpose; to review commitments made by the past NPT Review Conferences and create a scorecard for them all.

1 Fan Jishe is a Professor at the Institute for International Strategic Studies at the Party School of the Central Committee of the Chinese Communist Party, based in Beijing. The views expressed are his own.

COMMENT BY ALEXANDER KMENTT [1]

I greatly enjoyed reading Rakesh Sood's excellent and thoughtful paper. I would like to provide the following comments on the following specific issues raised in his paper:

1. AN ISSUE FOR GLOBAL CITIZENS

Thinking about the nuclear weapons issues as "global citizens and not as citizens of nuclear dependents" is an important starting point to get to a new conversation about nuclear weapons and nuclear deterrence. However, the binary characterization of those who insist that nuclear weapons have maintained peace and *those who insist that nuclear weapons are immoral* is not entirely correct in my view. The case against nuclear weapons developed in the humanitarian initiative and the TPNW is not primarily a moral argument but based on pertinent security arguments (that include a moral/ethical dimension).

Any use of nuclear weapons, as Sood rightly points out, would be catastrophic. The TPNW is a particular legal response to exactly this evidence on the humanitarian consequences and risks of nuclear weapons. One can agree or disagree with the legal dimension of the TPNW. However, the findings on the catastrophic consequences of nuclear explosions and nuclear risks are based on empirically demonstrable facts. They should be considered seriously in any cost–benefit analysis underpinning prevailing assumptions on nuclear deterrence. The breadth of consequences and risks of nuclear weapons should be weighed against their posited security benefit. What is the *balance of probability* between the belief that nuclear weapons deter and prevent large-scale wars and the knowledge that deterrence, including nuclear deterrence, can fail causing immeasurable humanitarian and other consequences? A focus on humanitarian consequences and risks of nuclear weapons challenges the assumptions that underpin nuclear deterrence.

If the short-, mid- and long-term consequences of nuclear weapon explosions and the interrelationship of these consequences are not only grave, but graver than previously realized and not yet fully understood, does this impact the nuclear deterrence cost–benefit analysis? What is the impact of these graver humanitarian consequences on the credibility of nuclear deterrence? At what stage and at which level of humanitarian impact and nuclear risks would the deterrence equation start to change? What in terms of humanitarian consequences is acceptable and for whom and are there objective criteria to gauge this?

How exactly do the nuclear-armed States integrate the humanitarian consequences on their own population, the presumptive opponent's population and on the rest of the world, innocent bystanders to this conflict, into their nuclear deterrence calculations? Moreover, how exactly do nuclear planners weigh a military target against collateral damage and what are the parameters for this, for example in the case of a major city? Given the probable transboundary consequences of nuclear weapons use, how are the international humanitarian law principles of distinction and proportionality applied vis-à-vis populations, including in third States that are not party to the conflict? What about the responsibility and the ability to clean up after an accident or use of nuclear weapons and to provide compensation? To what extent is this responsibility included in the decision-making process and in nuclear doctrines in nuclear armed States?

For non-nuclear-weapon States and from a global citizen's perspective, the grave humanitar-

1 Alexander Kmentt is an Austrian diplomat. The views expressed in this article are those of the author and do not necessarily reflect the positions of the Austrian Foreign Ministry.

ian consequences that would result from nuclear explosions are the risks to which they are exposed, against their will and outside their control. These risks stem from the fact that nine States in the world possess nuclear weapons and have based their security policies on nuclear deterrence. From this perspective, the collective nuclear weapons policies and actions of all nuclear-armed States and their allies create an aggregated and interconnected set of global nuclear risks. These threat perceptions stem from the concern about the humanitarian consequences and risks of nuclear weapons are not merely based on a *humanitarian* perspective or on *moral/ethical* grounds but based on equally valid and pertinent *security* considerations.

Once these issues are discussed in concrete terms and from a global citizen's perspective rather than merely national security perspectives or through the lens of nuclear deterrence relationships, the rationalization of nuclear deterrence and the balance of arguments may shift significantly. The global citizen's perspective also looks at the risks associated with the possession of nuclear weapons and the practice of nuclear deterrence per se, rather than from the actions of individual States. This provides an aggregated view of the nuclear weapons practices of all nuclear armed States and the resulting risk for all of humanity. This perspective underpins the TPNW.

2. DETERRENCE 3.0

Sood raises some highly pertinent questions in the Deterrence 3.0 section: "How should we define the success of our ability to navigate the next 75 years of the nuclear age—by nuclear elimination or non-use of nuclear weapons? Is living with the perpetual threat of nuclear annihilation the only way to survive? Is the only answer a nuclear global-zero world? How stable will a nuclear global-zero world be, and should stability even be the end objective? Do we believe that when we look into the abyss, the deeper and more frightening it is, it will ensure that we collectively turn back, every time?" [NB: The passage quoted is from a draft version of this paper.] He also rightly highlights the significant bearing of new technological developments (AI, quantum computing, cyber weapons, etc.) on the complexity of deterrence and the multiplied risks of system failures.

In the "Elements for Deterrence 3.0" section, he also rightly lists the need to prevent nuclear weapon use and extend and reinforce the informal taboo and to expose the limits to deterrence in a multiplayer game. While these points are, of course, extremely pertinent, they fall somewhat short in my opinion of the ambition of a *global citizen's perspective* that he has set out in his paper. While he rightly says that nuclear weapons cannot be wished away, nuclear weapons and the practice of nuclear deterrence can and should be challenged by the global citizenry in more ambitious terms.

The perspective on the global humanitarian consequences, across a wide range of sectors, and the lack of response capability to the human suffering and the risks associated with the possession of nuclear weapons and nuclear deterrence postures place the nuclear weapons issue firmly in a *human security* context. From the *human security* perspective ensues the question of *responsibility*. Can the threat of not only mutually assured destruction between adversaries but also the risk of inflicting global catastrophic humanitarian consequences, possibly threatening all humankind, be considered a responsible policy? Moreover, what is then the *responsibility* of the rest of the international community—non-nuclear-weapon States and global citizens?

A focus on and proper consideration of the humanitarian consequences and risks of nuclear weapons and the consequent global citizen's perspective challenges the 'normalization' of nuclear deterrence in the security policy discourse of nuclear-weapon States. It demands a

reassessment of what constitutes *responsible* behaviour raising pertinent questions on the legitimacy of the existing nuclear disarmament and non-proliferation regime and the nuclear status quo. I would argue that a global citizen's perspective should go beyond reinforcing the taboo and highlighting the limits of nuclear deterrence. The human security arguments and the increased understanding of nuclear risks lead to an appeal to the sense of *responsibility* of all States/global citizens to strengthen the normative framework of the nuclear disarmament and non-proliferation regime and to an unequivocal legal and political clarification that the current nuclear status quo of the perpetuated nuclear sword of Damocles can no longer be considered as legitimate or lawful.

Deterrence 3.0 from the global citizen's perspective must, thus, be focused on pushing for a move away from nuclear deterrence altogether and to identifying alternatives given the shortcomings and risks inherent in nuclear deterrence. Deterrence 3.0 should lead to a more constructive dialogue on the sustainability of nuclear deterrence, one in which the humanitarian consequences and risks of nuclear weapons for all humanity would be weighed against their perceived security benefits. Such a more ambitious approach has the potential of changing the politics of nuclear weapons and the perspective of how they are seen today as a means to guarantee security. It may lead to more transformational dynamics in the nuclear weapons discourse and jolt nuclear-dependent States into more determined nuclear disarmament action that they have been unable or unwilling to get to themselves.

Some of these points are developed in more detail in my forthcoming book, "The Treaty on the Prohibition of Nuclear Weapons: How it Was Achieved and Why it Matters" (2021). In addition, some arguments have been published in the Toda Peace Institute Policy Brief 104 "The Humanitarian Initiative and the TPNW", February 2021.

COMMENT BY ULRICH KÜHN [1]

First, Sood makes an important argument when lobbying for a better understanding of the shortcomings of past and present deterrence relationships (1.0 through 3.0). The general difficulty here seems to lie in intellectually and politically connecting the goal of disarmament to arms control and deterrence. Arms control, as described in the text in the words of Schelling and Halperin, had a rather limited though fundamentally important goal: the prevention of (nuclear) war, and therewith, perhaps, a global Armageddon. As an important addition, arms control was never meant to overcome deterrence relationships but to make them (more) stable. That does not mean that arms control and disarmament goals are mutually exclusive. The Intermediate-Range Nuclear Forces Treaty is a perfect example of an arms control treaty that resulted in radical disarmament measures. In order to make disarmament goals politically more viable, one could think about broadening the concept of arms control to include future-oriented expectations of 'positive peace' rather than the mere absence of war. Clearly, that would have to include the expectation that it is possible to overcome deterrence as a temporal construct on the way towards mutual security relationships that are not based on and dominated by deterrence anymore. One would then have to spell out the necessary steps, while simultaneously questioning some of the fundamental beliefs that underpin deterrence policies to this very day. Aiming to better understand today's deterrence 3.0 landscape (more actors, more technology; in short, more complexity), as suggested by Sood, is an important step—it might not be enough though.

Second, I am not sure it is helpful to link nuclear deterrence to regime survival. Clearly, for some leaders—most often authoritarian ones—State survival, regime survival, and personal survival are intrinsically linked to each other. However, nuclear deterrence does nothing to deter internal dissent, opposition, or protest. The concepts to analyse domestic threats to leadership might rather be found in 'rule of law' or 'resilience' approaches.

Third, to fully address the basic assumptions underlying Sood's analysis, it would be helpful to broaden the scope on States retaining nuclear weapons to include also the technical capacity (or latency) to build nuclear weapons from scratch and, possibly, within a rather short time frame. This would certainly further complicate future efforts 'to go down to zero' but would help shift the focus to those States that have, for whatever reason, not (yet) acquired nuclear weapons, but could do so.

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COMMENT BY PATRICIA LEWIS [1]

Several thoughts sprang to mind on reading this paper. First, were the elephants—yes, of course, the ones in the room, but also the white varieties and the one that people can only describe from their specific point of view.

Second, was the framing of the 'deterrence 1.0, 2.0, 3.0' worlds we are being asked to imagine. Clearly for reasons of brevity, each of these world versions are described telegraphically but these are the rarefied worlds of experts in nuclear strategy and military tactics which rarely correspond to the real world that most people inhabit.

My third realization was how little anyone really knows or understands when it comes to the intention of the 'other', the adversary, the competitor, the frenemy. Throughout the Cold War, the United States and the Soviet Union had all of humanity—mostly unknowingly—living on a knife edge of their misunderstandings and hair-trigger doctrines. That we got through this period was not a result of 'navigation'. Near misses were as good as a mile during the Cold War[2] but we do ourselves no favours by imagining we got through thus far solely by navigational skill. Luck undoubtedly had far more influence than most experts care to imagine.[3]

Nonetheless, the era of arms control helped address these problems—not always in ways that people had intended and not always in ways that were sustainable, but arms control was a mechanism for transparency and stability. In talking about what mattered, insights into the minds of the 'other' were gleaned. Not for nothing were the best intelligence officers dispatched to arms control talks (and they still are). Understanding what the other wants to control, is prepared to sacrifice or finds acceptable in exchange for something else is all vital information in the discovery of domestic power struggles, State intent and military strategy. This information is fed into analytic models for understanding how an adversary might act in response to an event or in a crisis and so can help reduce risk and increase genuine understanding.

Arms control created predictability via exchanging data, building knowledge on numbers, patterns and behaviours and helped stabilize the dangerous Cold War. This was not only about deterrence. This was also about understanding and creating new ways of interacting so that numbers could go down and tensions could relax. Verification—whether by national technical means from afar or by on-site inspections—played a vital role in creating the facts database that showed the understandings were (mostly) correct and that the adversaries could build confidence in their analyses and some trust in each other.

However, in thinking about today and how we might revitalize the pursuit of nuclear disarmament, we somehow managed to end up in nuclear deterrence 3.0. And it seems that no matter what version of nuclear deterrence we can imagine, each somehow has to contend with the idea of a nuclear 'first strike'—it feels a bit like Groundhog Day. Is this the world we confront in 2021? It is possible that there could be a first strike in the US–DPRK stand- off, but it wouldn't be a first strike as was imagined in deterrence 1.0 (or rather, deterrence 1.0 failure). Similarly, if there were a situation that led to nuclear weapons use between India and Pakistan

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2 Patricia Lewis et al., *Too Close for Comfort: Cases of Near Nuclear Use and Options for Policy*, https://www.chathamhouse.org/2014/04/too-close-comfort-cases-near-nuclear-use-and-options-policy.

3 Benoît Pelopidas, "The Unbearable Lightness of Luck: Three Sources of Overconfidence in the Manageability ofNuclear Crises", *The European Journal of International Security*, vol. 2, no. 2, 2017, pp. 240–262, https://doi.org/10.1017/eis.2017.6.

it would be horror beyond words, but it would not be the type of first strike prepared for in the 1970s and there would likely be very different reactions, consequences and ways forward.

In looking for solutions perhaps we need to think beyond a nuclear deterrence 3.0. Could we instead think about a complex set of adversarial relationships for which many different ways to deter hostile acts are at our disposal? A whole range of conventional weaponry and systems are the first line of deterrence in every playbook and economic or diplomatic tools also yield measurable results. Deterring cyberattacks cannot be done via clumsy nuclear weapons nor can dealing with homegrown or foreign terrorism. An excellent healthcare system and societal resilience is the best bulwark against biothreats as we have seen recently throughout the pandemic; nuclear weapons are unsuited for most today's threats in our multipolar world.

Going back to the nuclear deterrence elephant in the room, the huge issue that people pretend not to see and will not discuss, the elephant of which each 'nuclear expert' only sees one part, could this elephant be mutating into a white elephant—defined as 'a possession which its owner cannot dispose of and whose cost, particularly that of maintenance, is out of proportion to its usefulness'?[4] Progress could benefit from the understanding that in nuclear weapons we have a wicked problem in a complex world for which there is no single solution.[5] Could experts change the frame and instead stress-test nuclear weapons against the threats of today rather than the threats of deterrence 1.0? We could instead think of nuclear weapons as a dangerous, 75-year-old technology that we cannot ignore even though we recognize that it no longer plays a significant role in deterrence 3.0. We can recognize that nuclear weapons may be useful for deterring the use of nuclear weapons and deal with them that way. We have treated other weapon systems similarly. Chemical weapons, for example—still dangerous and they haven't completely gone away but they are now outlawed by international law and their threat has diminished down to assassination or corralling weapons wielded by fearful, corrupt governments. Nuclear weapons are indeed far more destructive than chemical weapons but given that the TPNW has created the law for their illegality, this may be an additional pathway for progress alongside the step-by-step disarmament process, the NPT, regional agreements such as nuclear weapon-free zones and old-fashioned arms control.

4 Oxford English Dictionary, cited in Wikipedia, https://en.wikipedia.org/wiki/White_elephant#cite_note-1.

5 Patricia Lewis, "Nuclear Weapons as a Wicked Problem in a Complex World", in Bård Nikolas Vik Steen and Olav Njølstad (eds), *Nuclear Disarmament: A CriticalAssessment*, 2019.

COMMENT BY TANYA OGILVIE-WHITE [1]

In his paper, Sood provides a concise summary of the challenges we face in revitalizing the pursuit of nuclear disarmament in today's complex world. He also raises questions and offers suggestions on how we might tackle these challenges. Three of the latter struck me as particularly compelling:

First is Sood's call for us to **go back to basics in our efforts to assess and understand today's nuclear risks**. This is important not only because it opens space for constructive dialogue between divided deterrence and disarmament communities, but because when it comes to understanding nuclear risks (including nuclear disarmament risks) there are so many unknowns that need to be probed. So much of the current debate is underpinned by assumptions which, to use Sood's terminology, were relevant to the worlds of deterrence 1.0 and 2.0, but which may no longer hold in today's more complex, faster-paced world of deterrence.

Stripping back these assumptions and looking afresh at nuclear weapons in the context of new technologies and new domains of warfare could be daunting, not least because it could create serious communication challenges for governments, but it is urgent and needs to occur at multiple levels within and between States and international organizations. Crucially, the process of reassessing nuclear risks and visualizing deterrence failures could help spur nuclear risk-reduction measures and encourage nuclear-armed States to review the logic of some of their nuclear modernization efforts. While modest in the overall context of nuclear disarmament, these steps would help reverse the growing salience of nuclear weapons and enable further steps down the disarmament path.

Second, expanding on the first point, is Sood's call to **push the bar to nuclear use higher**, requiring us to search for concrete and realistic ways to reinforce the nuclear taboo and avoid conflict escalation. Sood proposes a number of different measures to achieve this, including persuading more and more nuclear-dependent States to accept no-first-use until it evolves into a global non-use norm—a proposal that could attract more interest following fresh risk assessments and that deserves our attention. In fact, all the proposals that Sood outlines on reduced salience and non-use are worth exploring in more detail, including the practicalities of how they could be implemented and their potential implications for strategic stability in a world of deterrence 3.0. Numerous informal dialogues on this subject are already underway, but there should be scope for dedicated formal dialogues, including bringing TPNW States parties and civil society groups into discussions on nuclear (and wider) deterrence issues with the nuclear-dependent States. Achieving a shared vision of nuclear disarmament and a realistic path towards nuclear elimination requires the development of new knowledge networks that possess a holistic understanding of deterrence and disarmament. This will only be possible if the barriers to knowledge are removed and access to well-informed debate is provided, including far greater transparency on nuclear doctrines and postures.

Last but not least, is Sood's call for us to approach the issue of nuclear disarmament as global citizens rather than as citizens of nuclear dependents or nuclear rejectionists. Given the existential threat they pose, it should be axiomatic that dealing with nuclear weapons is a shared problem and maintaining peace a shared responsibility for all humanity. Yet these points are often lost in debates on nuclear deterrence and disarmament, especially in discussions that take place at the domestic level. This leads me to ask: What would encourage us to identify

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more strongly as global citizens (in addition to our other identities) with common interests and shared responsibilities? To me, this question drives to the heart of all discussion on existential threats: fostering the evolution of a global citizenry is not an abstract philosophical notion but a fundamental and practical necessity if nuclear elimination is ever to be achieved. Difficult questions need to be addressed on how/to what extent identifying as global citizens drove the humanitarian initiative and TPNW; how/to what extent citizens of nuclear dependents identify as global citizens; what factors influence these outcomes; and what can be done to advance a global citizenry and global strategic culture.

COMMENT BY GEORGE PERKOVICH [1]

Some of Rakesh's paper gets at questions about why States want to retain nuclear weapons—that is, what good they provide. If nuclear weapons are instrumentally good, then to persuade those who rely on them to get rid of them would require providing substitute goods—by removing threats, or deploying better alternative defenses, or offering other forms of global power. But I think both parts of the proposition are debatable.

Many advocates of nuclear prohibition or disarmament reject the idea that these weapons do any good. That view would perhaps make many people disinclined to help provide or encourage the provision of substitutes. We could also argue that whether or not nuclear weapons provide goods —e.g., deterrence—there are other factors that make States cling to them, and/or there are other factors that should make States get rid of them even if substitute goods are not found. For example, the risks of deterrence failure are too great to tolerate, even if successful deterrence is a good. Or, using these weapons would be immoral and this overrides any material benefit they may provide. My own view is that States and people who become attached to nuclear weapons do so for causes that go beyond the good the weapons provide. People are often unconscious or only semi-conscious about these factors: bureaucratic mission and tradition, job and income dependency, psychological fulfillment, and so on. It is probably impossible to change these attachments in all the people and institutions that would be required to 'permit' their State to agree to relinquish all these weapons. Thus, the practical challenge would be to mobilize enough incentives—voluntary or coercive—to entice or compel apex leaders to make such a decision and then impose it on subordinates. Among other things, this suggests that States will be very unlikely to eliminate nuclear arsenals through democratic processes.

Coming back to Sood's paper and more specific issues, I think some of the motivations that he identifies for US behavior and that of other nuclear-armed States are questionable. In the post-Cold War period, for example, I don't think the United States developed conventional prompt global strike capabilities "to reduce the salience of nuclear weapons". The United States developed options to deploy conventional global strike capabilities (which it did not in fact deploy) to provide a greater combination of speed, range, and precision than other weapons, including more destructive nuclear warheads. If such a weapon could supplant some nuclear weapons this would be an additional advantage. But this supplantation was not the motive. (One reason conventional warheads were not put onto US ICBMs was fear that the Russian Federation or others might mistake the launch of such missiles for launch of nuclear weapons).

This story raises several questions:

1. Are there types of weapons or coercive capabilities that could provide today's nuclear-armed States with alternative deterrent and warfighting effects that would besufficiently attractive to make them willing to give up nuclear weapons?
2. Are there types of weapons now being developed and deployed—cyber, AI-controlled drones of various sizes, lasers—that simultaneously intensify States' attachments to their own nuclear deterrents and threaten those deterrents in destabilizing ways? In other words, new weapons that exacerbate both arms race and crisis instability?
3. If States engaged in such arms competitions lack the capacity or the will to devise mechanisms to stabilize their relationships—at the level of weaponry and/or politics—will other

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States become more alarmed? If so, will any additional States seek nuclear weapon capabilities?

4. Will all nuclear-armed States be willing to relinquish nuclear weapons only after their relationships with primary adversaries have become normalized/pacified or those adversaries have relinquished military capabilities that are now balanced by nuclear weapons?

The TPNW and its proponents appear to take the position that none of the first three questions are decisive, and the premise of the fourth is unacceptable. States should just accept prohibition and disarm whether or not they have sufficiently effective alternative means to deter or defeat their powerful adversaries and whether or not their relationships with such adversaries have changed fundamentally. Is this a correct interpretation of a common prohibitionist view? And, if so, then what is the detailed theory of political change by which not only the United States, France and the United Kingdom would be persuaded to relinquish nuclear weapons, but also China, the Russian Federation, Israel, India, Pakistan, and the Democratic People's Republic of Korea where leaders' susceptibilities to public disarmament movements are difficult to imagine.

Because the NPT process, aside from the General Assembly, includes the most States (though, importantly, not India, Israel, Pakistan or the the Democratic People's Republic of Korea) it would be interesting to devote time in preparatory or review conferences to invite States to answer these questions.

Sood asks another question: what is the role of nuclear weapons if they cannot ensure regime survival, as they failed to do in the cases of apartheid South Africa and the Soviet Union? This question is welcome because it indicates the ongoing need to clarify the very limited potential roles of nuclear weapons. They cannot save a regime against its own population or fundamental inadequacies. Their only potential utility is to deter outside actors from aggression whose violence is so massive that a leader would be willing to risk nuclear war to try to stop it. Otherwise, to initiate use of nuclear weapons in response to an aggression that is less destructive than nuclear war would predictably be is an insane thing to consider. This does not preclude the use of a small number of relatively low-yield nuclear weapons against remote targets intended to stop an aggression or keep one from escalating. However, it is the very risk of further escalation that is supposed to make such limited use work as a deterrent, and there are no data on whether nuclear use can be kept limited in a contest with two or more nuclear-armed States. (I assume here that today's nuclear-armed States would only use nuclear weapons against an adversary that possesses nuclear weapons—directly or via an alliance with the United States—or perhaps massively destructive bioweapons.)

If this basic principle of proportionality is correct, then reinforcing the taboo against nuclear first-use depends to some extent on ensuring that no government undertakes a major invasion or attack on another nuclear-armed state or an ally or partner of the United States. To put this another way, I agree with Sood that reinforcing the nuclear taboo should be a great priority, and that this can and should be done as a simple proposition. But in the more complex reality of relations between—say, the United States and the Russian Federation and China; China, India and Pakistan; and the United States, the Democratic People's Republic of Korea and the Republic of Korea—equal attention needs to be devoted to motivating these governments to reassure each other that they will not use force to pursue territorial claims or regime change.

Both of these objectives—the nuclear taboo, and reassurance of military–political restraint—have traditionally received less attention in the NPT process, the Conference on Disarmament, and the nuclear disarmament movement than has been devoted to nuclear weaponry per se.

The unique destructive power of nuclear weapons easily moves us to fetishize them. But, as Sood's paper and my comments above suggest, other military capabilities and the decision making of leaders (and parties) about going to war deserve increased attention.

Various governments and civil society organizations will give different priority to nuclear disarmament and preventing any form of war between nuclear-armed States, but rather than argue over which is more important they should be encouraged to publicly embrace and promote both objectives. Reinforcing the nuclear taboo and the importance of continuing the avoidance of nuclear war is one way to do this.

COMMENT BY TOM PLANT [1]

A central feature of the paper, and in much of the contemporary policy discourse, is what it characterizes as the complex nature of the global nuclear system. This is hard to contest, but leads to an analytical quandary—how can we make progress in controlling this system such that it cannot tip into catastrophe when we cannot fully comprehend how the system works? This in turn provides equally fertile ground for those who wish to argue either the only solution as complete nuclear abandonment, on the grounds that this is the only way to break out of the system, and for those who wish to argue that the uncertainty in how this complex system might evolve means that it is too difficult to contemplate any deviation from the status quo at this time. Both positions smack to me of intellectual laziness and post-hoc rationalization of predetermined preferences. The author in their analysis of 'deterrence 3.0' makes some progress in addressing this challenge—issues around the specific policy prescription to reinforce the nuclear taboo are discussed below—but I think does not go far enough in addressing the implications of increasing complexity for how we think about multipolarity, stability, arms control and disarmament.

So, what is new about complexity in the nuclear landscape, and how does this change how we address it? Some degree of complexity has always been with us, after all. Even as they considered dyadic game theoretical models of nuclear deterrence and bargaining, the earliest scholars of deterrence were no more blind than we are today to the limitations of this approach, and to the social complexity of the deterrence system. It has long been acknowledged that decision-making by involved in deterrence is influenced by their social environment, including their relationships with other 'players' in this putative game,[2] and Schelling's foundational work *Strategy of Conflict* explicitly addresses some of the practical implications of the influence of environmental factors on decision-maker preference for one perceived solution over another. Scholars have for decades indicated the limitations of a non-behavioural game theoretic approach to understanding and practicing deterrence,[3] and highlighted that the way that decision makers "perceive and react to threats, and how they determine their vital interests and calculate the costs and benefits of alternative outcomes",[4] and moreover to signal to adversaries,[5] is more determinative than the outputs of "some heuristic game of questionable relevance to the real world".[6]

Other features of the landscape that are often cited as causes of complexity are the interaction of non-nuclear technologies with nuclear weapon systems, of which so-called novel technologies are most often discussed, and the multipolarity of the nuclear system. To take the second point first, I am far from convinced that our world is multipolar. Do several States have similar degrees of military, cultural and economic influence across the globe? I do not believe that they do, nor that they are tending particularly in that direction.[7] To take the nuclear landscape in isolation—itself a derogation from the more holistic concept of polarity—do

1 Tom Plant is Director of the Proliferation and Nuclear Policy Programme at the Royal United Services Institute in the United Kingdom. The views expressed are his own.

2 See e.g. Michael Maccoby, "Social Psychology of Deterrence", *Bulletin of the Atomic Scientists*, vol. 17, no. 7, 1961, pp. 278-281, doi: 10.1080/00963402.1961.11454249.

3 Thérèse Delpech, "Concepts", in *Nuclear Deterrence in the 21st Century: Lessons from the Cold War for a New Era of Strategic Piracy*, 2012, http://www.jstor.org/stable/10.7249/mg1103rc.7.

4 Richard C. Snyder, *Political Psychology*, vol. 8, no. 2, 1987, pp. 275–278, doi:10.2307/3791309, reviewing Robert Jervis et al., *Psychology and Deterrence*, 1985. doi:10.1353/book.74118.

5 Robert Jervis et al., *Psychology and Deterrence*, 1985. doi:10.1353/book.74118.

6 Thérèse Delpech, "Concepts", in *Nuclear Deterrence in the 21st Century: Lessons from the Cold War for a New Era of Strategic Piracy*, 2012, http://www.jstor.org/stable/10.7249/mg1103rc.7.

7 E.g. Andrey Kortunov, "Why the World is not Becoming Multipolar", 2018, https://russiancouncil.ru/en/analytics-and-comments/analytics/why-the-world-is-not-becoming-multipolar/.

several States exert approximately equal degrees of influence on the various constituent parts of that landscape? Clearly, they do not. It seems instead that the term 'multipolarity' is instead used as a shorthand description of a world where nuclear powers can affect and be affected by the nuclear decision-making of several others.

This casual use of the term is unfortunate because it reinforces three unhelpful implicit notions: first, that the decisions of nuclear possessors and nuclear seekers are affected *only* by the nuclear —and maybe 'strategic', a term for which again definitions vary according to convenience— capabilities and decisions of others in this small group, or even simply by calculations of who has what nuclear system; second, that power ('polarity') is determined by nuclear ownership; and third, that the role and responsibilities of non-nuclear States can for analytical purposes be neglected. Instead, it would be better to think of our nuclear system, as with our global system, as in transition from a briefly unipolar world, with uncertain destination, comprising a network of political, economic, military and cultural ties overlying and interacting with strictly nuclear relationships to create a web of dependencies, opportunities, and conflicts of interest (for ease of reference we might term this the broader nuclear system).[8]

This allows us then to assess the real significance of the other cited cause of complexity in the broader nuclear system, namely the interaction of non-nuclear technologies with nuclear weapon systems. The author has indicated technologies such as artificial intelligence, hypersonic weapons systems, directed energy weapons, cyber capabilities, quantum computing, stealth and autonomous systems as particular sources of this complexity. But why are these privileged in the analysis? In several cases less esoteric capabilities are far more important to nuclear dynamics than these: the massed artillery of the Democratic People's Republic of Korea on the border with the Republic of Korea, for example, is more concerning to Seoul than Pyongyang's nuclear weapons; Kaliningrad would be more directly threatened by similar capabilities and by other airstrikes than it would be by NATO nuclear weapons; the United Kingdom cares more in deterrence terms about the capabilities of Russian ballistic missile defences than it does about Russian strategic nuclear capabilities; it is the geography and conventional imbalance of forces in south Asia that drives Pakistan to develop battlefield nuclear weapons, not Indian nuclear capabilities; and so on.

I am not arguing that the cited technologies are not important—I agree that they are—but I am arguing that the appropriate lens to consider whether or not a technology is particularly relevant to nuclear dynamics in a particular time and place is its ability to threaten the vital interests of a nuclear possessor, as perceived by that possessor. We need to be open to arms control and disarmament discussions that look more broadly than nuclear States and more broadly than nuclear capabilities, and are founded instead on the principle that the objects of discussion should be the offence–defence balance between powers that feel threatened by one another,[9] and the minimum means necessary for offensive defence set against a renewed focus on defensive defence (which might involve discussing controls on, or transparency in relation to, strike capabilities in general).[10] This means that non-nuclear weapon States would have to assume more of the responsibility for driving nuclear arms control by considering the impact that their defence capability decisions have on the broader nuclear system—but also

8 Peter W. Schulze, "Multipolarity and Multilateralism: Cooperative or Rival Cornerstones of a New World Order?", 2019, https://doc-research.org/2019/12/multipolarity-and-multilateralism/.

9 Charles L. Glaser and Chaim Kaufmann, "What Is the Offense-Defense Balance and Can We Measure It?", *International Security*, vol. 22, no. 4, 1998, pp. 44–82, doi:10.2307/2539240.

10 See e.g., Stephen Biddle, "Rebuilding the Foundations of Offense-Defense Theory", *The Journal of Politics*, vol. 63, no. 3, 2001, pp. 741–774, http://www.jstor.org/stable/2691712; Anders Boserup and Robert Neild (eds), *The Foundations of Defensive Defence*, 1990, doi:10.1007/978-1-349-20733-6.

that they would need to have a greater role and rights to go with that responsibility than the essentially hortatory position in which they are cast by current models of arms control and disarmament negotiation.

Perhaps the most important practical implication of the 'broader nuclear system' concept though is that it is exceptionally unlikely that the web of relationships it comprises could have some globally effective higher-ordering principle imposed upon it. One need only look at leading candidates for such principles to date to see the difficulty of achieving such a goal: the NPT codifies a set of principles that are broadly but not totally accepted; the TPNW is a similar codification of a different set of principles that at present are less accepted but have attracted substantial support; and the existence of a nuclear taboo is contested, as I discuss below. A second implication is that, like it or not, an ordering principle or set of principles for nuclear weapons cannot be developed without reference to the other material components of the nuclear system—the NPT again serves as an example here in that it deals with the interaction of economic and political issues with security issues through its peaceful-use strand. A third and final implication is that any such set of ordering principles must be able to cope with structural changes in the broader nuclear system—including those which do not directly involve changes to nuclear stockpiles, capabilities, doctrines and so on—by adapting to them, being designed to accommodate them, or through design of those principles for managed abandonment.

Here, for example, the author prescribes reinforcement of the nuclear taboo[11] as a means of reducing the risk of nuclear use, which at face value is an attractive proposition—but empirical analyses of this theorized taboo have yet consistently to find strong evidence of its existence in the United States[12]. These studies are silent on the question of whether elite decision makers feel a taboo that their populations do not; but it may also be that observed preference against nuclear use is simply down to perceived lack of utility (i.e., benefits achieved set against the costs of use) rather than other moral or strategic logics, or that habits of non-use are strong and passively mimic the observable characteristics of a taboo that more actively opposes use.

Regardless, I support the author's suggestion that efforts to develop and strengthen a nuclear taboo be made, on the basis that I believe at worst it does no harm and at best does some good (though we cannot expect States whose doctrine relies on the threat of nuclear use to engage wholeheartedly with such an effort; we might instead stimulate a discussion on the language and other means by which nuclear possessors use to communicate their status with the aim of initially developing a taboo on fetishizing or emphasizing nuclear weapons in domestic and international discourse). By the same arguments that undermine purely game-theoretic, model-based analysis of deterrence dynamics, though, any such preference to avoid nuclear use cannot be considered global but rather local—if this phenomenon exists it is a felt by the individual decision maker in psychosocial terms, and thus must be rooted in the strategic history and culture within which they sit. Efforts to reduce the attractiveness of nuclear use must therefore be similarly situated. In practical terms this means that global campaigns are less likely to be effective than national or regional ones.

In terms of avenues for further study, my opening comments I think highlight the salience—

11 Nina Tannenwald, *The Nuclear Taboo: The United States and the Non-Use of Nuclear Weapons Since 1945*, 2007, doi:10.1017/CBO9780511491726.

12 Daryl Press, Scott Sagan and Benjamin Valentino, "Atomic Aversion: Experimental Evidence on Taboos, Traditions, and the Non-Use of Nuclear Weapons", *American Political Science Review*, vol. 107, no. 1, 2013, pp. 188–206, doi:10.1017/S0003055412000597; Scott Sagan and Benjamin Valentino, "Revisiting Hiroshima in Iran: What Americans Really Think about Using Nuclear Weapons and Killing Noncombatants", *International Security*, vol. 42, 2017, pp. 41–79, doi:10.1162/ISEC_a_00284.

perhaps the forgotten salience—of the traditional literature even to our contemporary security environment. We can however acknowledge them as incomplete and identify where further work might be useful in revisiting them. For example, there has been relatively little consideration of the role of fairness or third-party perceptions of fairness in deterrence decision-making, despite advances in other fields indicating that this is a key driver of costly punishment decisions[13]—into which category the threatened responses involved with nuclear deterrence fall—and despite the fact that some treatments in other fields have attempted to integrate this into game theoretic models to account for at least some of the shortfalls identified earlier in this note.[14] More broadly, while the behavioural economic literature on punishment and deterrence, particularly in relation to criminal justice, has advanced substantially in recent decades,[15] comparatively little recent research on nuclear deterrence and disarmament issues has taken a similarly applied approach.[16]

13 M. Hetzer and D. Sornette, "An Evolutionary Model of Cooperation, Fairness and Altruistic Punishment in Public Good Games", *PLoS ONE*, vol. 8, no. 11, e77041, 2013, https://doi.org/10.1371/journal.pone.0077041.

14 Matthew Rabin, "Incorporating Fairness into Game Theory and Economics", *The American Economic Review*, vol. 83, no. 5, 1993, pp. 1281-1302, http://www.jstor.org/stable/2117561.

15 See e.g. Daniel S. Nagin, "Deterrence in the Twenty-First Century", *Crime and Justice*, vol. 42, no. 1, 2013, pp. 199–263, doi:10.1086/670398.

16 Potential applications are explored in a limited way, but not fully developed, in Anne I. Harrington and Jeffrey W. Knopf (eds), *Behavioral Economics and Nuclear Weapons*, 2019, http://www.jstor.org/stable/j.ctv5npjp8.

COMMENT BY SERGEY ROGOV [1]

[NB: The passages quoted in this comment are from a draft version of this paper.]

The paper "Revitalizing Pursuit of Nuclear Disarmament" by Rakesh Sood presents a solid analysis of the strategic situation in the twenty-first century. The author correctly says: "First, as long as some States retain nuclear weapons others will have a justification to acquire them. Second, while nuclear weapons exist the likelihood of their use, deliberate or accidental, cannot be completely discounted. Third, any use of nuclear weapons would be catastrophic". He also remarks that "during the Cold War strategic stability was equating to nuclear stability in a bipolar context. The two States accumulated obscenely bloated arsenals and much of bilateral arms control has been devoted to reducing these numbers by nearly 75 percent. Arms control sought to manage the arms race and ensure that it did not threaten 'deterrence stability'".

Unfortunately, the author never mentions the term 'mutual nuclear deterrence' or 'mutual assured destruction' (MAD) as a unique model of rigid interaction between the two nuclear superpowers. MAD was codified in the arms control agreements between the United States and the Soviet Union. This model survived the end of the Cold War and continues until now.

The author speaks about nuclear dyads (US–Russia, US–China, US–DPRK, India–Pakistan, India–China and potentially more), but only the US–Russian dyad can be described as 'mutual assured destruction'. Some other dyads may in future evolve into MAD, but it has not yet happened.

The United States and the Russian Federation still carry the main responsibility for the arms race. Are they forever doomed to be hostages to MAD? Or can Washington and Moscow move away from the MAD model and while still maintaining nuclear deterrence treat each other like London and Paris?

In my view there was a chance to do that after the end of the Cold War, but it was wasted when the United States tried to consolidate the unipolar world with itself as a single superpower without a peer competitor. The drive to pre-eminence produced a deep crisis of the arms control regime (CTBT, ABM, Intermediate-Range Nuclear Forces Treaty, Open Skies treaties) during the period which the author calls the world of Deterrence 2.0. But this is not discussed in the paper.

Strategic stability in the twenty-first century faces two major challenges. First, strategic stability during the Cold War developed in a bipolar system of international relations ruled by two superpowers, the United States and the Soviet Union. Today's system of international relations is polycentric in nature. Second, whereas strategic stability was previously defined primarily by nuclear weapons parity, the latest non-nuclear weapons, capable of destroying some strategic targets, play an ever-greater role today. This makes maintaining strategic stability extremely difficult.

I disagree with the claim that "New Start was the last achievement driven by the momentum of the US unipolar moment". In fact, it was a departure from unipolarity, since the treaty confirmed the strategic parity between the United States and the Russian Federation despite

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huge political and economic asymmetries.

I don't think that the purpose of nuclear deterrence is to provide domestic security to a regime. That's why I disagree when the author writes: "Questions remain about how nuclear weapons had neither provided security to the apartheid regime in South Africa nor prevented the break-up of the Soviet Union". Nuclear deterrence is supposed to tackle external, not internal threats.

I also disagree that "the United States developed the conventional prompt global strike capabilities. NPT was extended into perpetuity". It hasn't happened yet despite huge investments.

But I agree with what the author writes about "enabling technologies like AI, quantum computing and cyber weapons" and "developments of kinetic weapons like hypersonic glide vehicles and hypersonic cruise missiles, high energy lasers and stealthy autonomous systems with strategic capability". He is also correct when he says: "It depends on how visible is the development—hypersonic delivery systems or missile defences are visible to the adversary as these need to be tested. On the other hand, AI or cyber capabilities are not visible till deployed. When it becomes visible, the question arises of attribution and interpretation of whether it was for intelligence or in preparation for a first strike".

The author is absolutely correct when he writes: "The challenge is therefore to prevent nuclear weapon use, and extend the informal taboo that has lasted 75 years, while continuing to expose the limitations of nuclear deterrence. It means retaining the existing arms control framework built upon Deterrence 1.0 and 2.0 but accepting its limits in face ofcurrent political reality".

At the end of his paper the author makes eight suggestions:
1. reducing where possible to lower levels; and that is why
2. extension of New Start is a positive development;
3. removing temptations of first strike;
4. getting rid of ground-based missiles where possible, because these are targets (especially in fixed silos) for adversaries that have advanced surveillance capabilities;
5. persuading more and more nuclear-dependent States to accept no-first-use until it evolves into a global non-use norm;
6. limiting the role of nuclear weapons to 'sole purpose' because as we have seen, regime protection is not guaranteed by nuclear weapons;
7. de-alerting; and
8. finally, creating command and control mechanisms that are deliberative and consultative.
9. I disagree with four of these suggestions.

Point #4 about ground-based missiles. When the author says that "MIRVs on ICBMs could tempt an adversary to go first but [submarine-launched ballistic missiles] can strengthen deterrence by ensuring an unacceptable second strike" he is correct but this conclusion is applicable only to the United States and the United Kingdom. That's why this idea is now debated among US experts. But even the United States will likely maintain its ICBMs. For the Russian Federation and China, the land-based leg of the triad, in particular mobile ICBMs, is necessary for a number of reasons (geography,cost, etc.). Probably that is also true about other nuclear-weapons States.

Point #5 about no-first-use. It's a nice idea but huge conventional disparities can make it very controversial. That's why most of the nuclear powers are not enthusiastic about no-first-use.

And fast development of non-nuclear strategic weapons makes the commitment to no-first-use even less likely.

That is also applicable to point #6 about "sole purpose".

Finally point #7 about "de-alerting" is also controversial, since it may be technically difficultto implement for technical reasons—with liquid-fuelled missiles, but also probably unverifiable with all submarine-launched ballistic missiles.

"Thomas Schelling and Morton Halperin defined arms control as 'all forms of military cooperation between potential enemies in the interest of reducing the likelihood of war, itsscope and violence if it occurs, and the political and economic costs of being prepared for it'." This does not include 'disarmament' but does visualize the failure of deterrence and the need to prepare for it.

The author is correct when he emphasizes that "Strategic stability is no longer equated with only nuclear stability" and "To craft a new nuclear order, we need to design Deterrence 3.0 for a multipolar nuclear world".

Maintaining strategic stability will require several new agreements, which would be not only a continuation of New START, but also cover all classes of nuclear weapons, as well as the latest non-nuclear strategic systems.

The task is to 'reinvent' arms control and make it relevant to geopolitical and technological realities of the twenty-first century.

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