

3 Lessons from Existing WMD Multilateral Programmes and Platforms

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Global governance of what are now classed as weapons of mass destruction (WMD) has a long history, predating the United Nations, the nuclear age and the introduction of the term as a general category of weapons. The horrors of chemical weapons use in World War I prompted international efforts to outlaw such weapons. As the world entered the nuclear age following World War II, the prospect of atomic warfare and the existential risk to humanity was an early priority of the United Nations. Over the subsequent decades, an increasingly elaborate system of treaties, regulatory regimes and institutions has been developed to try to eliminate, or at least manage and reduce, this global catastrophic risk.

And we are all still here; the Earth is not (yet) a smoking ruin. This may be due to the success of existing global governance efforts, or to luck or both. But the risk remains. So, what can we do better? In the current geopolitical circumstances, and given the complex and interlocking layers of existing international law and institutions, are there practical and feasible ways that we can address weaknesses in global governance of WMD and better manage the catastrophic risks posed by WMD?

The answer is yes.

WMD as Global Catastrophic Risks—Nuclear, Chemical and Biological Weapons

Nuclear weapons need little introduction as global catastrophic risks. From their first use in Hiroshima and Nagasaki in 1945, nuclear weapons have been associated, in both the public imagination and among political elites, with the prospect of global catastrophe, the end of civilisation and possibly even the extinction of humanity. And these impressions are largely backed by science and data assembled over the past few decades. While it is possible to exaggerate the effects of an all-out nuclear war—human extinction is unlikely, and the total collapse of civilisation is not a given—there is no question that global catastrophe would result. Tens or hundreds of millions of direct casualties, many more poisoned by radiation, colossal destruction of infrastructure and damage to the natural environment would be followed by disastrous follow-on effects, including economic collapse, mass movements of refugees, disease, and famine (Schell 1982).

Even a limited, regional nuclear conflict would have catastrophic global effects. This has been known for decades, but the evidence continues to grow and paints a sobering picture.¹ The most recent study of the possible effects of nuclear detonations on climate and food production concluded that a regional nuclear war could lead to more than two billion deaths worldwide due to reduced food production (Xia *et al.* 2022).

Public and political interest in the risk of nuclear war has fluctuated over the years according to geopolitical circumstances, relations among the nuclear-armed states, current conflicts and crises, and competing concerns. The end of the Cold War brought a relatively long period of nuclear optimism, or perhaps complacency, where the threat gradually receded from the public conscience. Russia's invasion of Ukraine in 2022, and the associated nuclear rhetoric and responses, brought it abruptly back to the forefront of concerns. But it is important to recall that throughout these fluctuations of concern, the risk has always been there: hundreds of nuclear weapons on high alert, ready to be launched within minutes. Many accidents and close calls have been documented; presumably, many others remain classified (Lewis *et al.* 2014; Schlosser 2014). In contrast to the slow but steadily advancing catastrophe of human-induced climate change, nuclear war is a global catastrophe that could occur instantaneously, literally at any minute—whether deliberately or by accident or miscalculation—and this has been the case for decades.

But nuclear weapons are only one kind of weapon of mass destruction. The other two weapons falling under this admittedly rather arbitrary label are biological and chemical weapons. Neither has the apocalyptic potential of nuclear weapons, but the COVID-19 pandemic has vividly illustrated the global catastrophic risk of a biological weapon. There are various other ways in which a biological weapon could have a global impact, including through targeting crops and livestock.

Chemical weapons are clearly the least massively destructive of the three types of WMD, with effects much more limited in area, generally effective countermeasures and response options and a consequent relative lack of potential to inflict death and disruption on a large scale. It is no coincidence that of the three types of WMD, it is chemical weapons that have been most used in warfare and for terrorism, and that are most likely to be used today. The inclusion of chemical weapons in the WMD definition appears to be partly due to lasting horror at the results of their widespread use in World War—which led to their being linked with biological weapons in the 1925 Geneva Protocol (United Nations 1925)—and partly to fears that use of chemical weapons would ease the way to, or provoke, the use of biological or nuclear weapons.²

The International Response So Far: An Interlocking Legal Patchwork

Given the evident global risks, it is no surprise that the international community has attempted to respond with governance measures. The very first resolution adopted by the United Nations General Assembly in 1946 established a commission 'for the elimination from national armaments of atomic weapons and of all other major weapons adaptable to mass destruction' (United Nations 1946). This was followed by numerous other resolutions and multilateral efforts in the 1950s and 1960s, including the creation of the International Atomic Energy Agency in 1957 and the conclusion of the Partial Nuclear Test Ban Treaty in 1963. But it was around 1970 that the current international legal regime governing WMD began to take shape.

The Non-Proliferation Treaty (NPT) (IAEA 1968) was signed in 1968 and entered into force in 1970. This treaty, commonly referred to as the 'cornerstone' of the international regime governing nuclear weapons, attempted to freeze the number of nuclear-armed states of the five then existing (China, France, the Soviet Union (now Russia), the United Kingdom and the United States) by preventing further proliferation of nuclear weapons while requiring the five 'official' nuclear-weapon states recognised in the treaty to pursue nuclear disarmament. The nonproliferation obligations of the NPT are implemented

through a system of safeguards operated by the International Atomic Energy Agency (IAEA), designed to ensure that fissile material is not diverted for use in nuclear weapons. Today, the NPT has a large membership of 191 states parties; only India, Israel, North Korea, Pakistan (all nuclear armed),³ and South Sudan remain outside the treaty.

The NPT was followed throughout the 1970s, 1980s and 1990s by a series of bilateral treaties between the United States and the Soviet Union—the Strategic Arms Limitation Talks Agreements (SALT) and the Strategic Arms Reduction Treaties (START),⁴ among others—which limited and later significantly reduced the nuclear arsenals of each.

On the multilateral front, the NPT was joined in 1972 by the Biological Weapons Convention (BWC) (United Nations 1972), which was the first multilateral treaty to prohibit an entire category of weapons. The BWC contains a broad and robust prohibition of biological weapons but does not include any verification provisions or establish an international organisation to manage the implementation of the treaty. There had been attempts to negotiate a treaty prohibiting both biological and chemical weapons—envisaged as a successor to the 1925 Geneva Protocol, which prohibits the use in warfare of both, but not their development or possession—but political differences on chemical weapons resulted in a decision to separate the two. The Chemical Weapons Convention (CWC) (OPCW 1992) had a long period of gestation but was concluded in 1993. It contains analogous prohibitions to the BWC but includes an elaborate implementation and verification system operated by a dedicated international organisation, the Organisation for the Prohibition of Chemical Weapons (OPCW), based in The Hague.

The adoption of the more elaborate CWC inspired BWC states parties to begin negotiating a protocol to the treaty, which would add similar verification provisions and establish an international organisation. These negotiations collapsed in 2001, sending the BWC on a different path that included the establishment of a small Implementation Support Unit for the treaty in 2007 (Lennane 2006; Millett 2011).

The three multilateral WMD treaties were conceived to deal principally with WMD possessed—or that might come to be possessed—by states. None of them deals directly with the prospect of non-state actors acquiring or using WMD, although they each have provisions on transfers and on national implementation that have the indirect effect of making it more difficult for non-state actors to acquire WMD. While various concerns were raised over the years about the possibility of terrorists using WMD, it was the September 11 attacks in the United States in 2001 that really focused serious global attention on the risk. The result was UN Security Resolution 1540, adopted unanimously under Article VII of the UN Charter in April 2004, which obliges all UN member states to develop and enforce appropriate legal and regulatory measures against the proliferation of chemical, biological, radiological, and nuclear weapons in order to prevent non-state actors from acquiring WMD. Implementation of the resolution is overseen by the 1540 Committee of the Security Council, with a small staff of technical experts to help member states implement their obligations.

Evaluation of the Response: The Good, the Bad and the Ugly

Although the international legal regime governing WMD is something of a hodgepodge, overall, it has seen some significant success in preventing, or at least diminishing the likelihood of, the use of WMD and a global catastrophe. There are, however, some important and worrying weaknesses, as well as a significant difference between the results on nuclear weapons and the results on biological and chemical weapons.

Nuclear Weapons

The NPT is widely regarded as having been remarkably successful in preventing the spread of nuclear weapons. Apart from the five nuclear-weapon states recognised by the treaty, only four other states, India, Israel, North Korea, and Pakistan, have acquired nuclear weapons, making a total of nine nuclear-armed states worldwide. This is a much lower number than had been expected in the 1960s, before the conclusion of the NPT. There is certainly reason to be concerned about the four nuclear-armed states *outside* the NPT, none of which show any signs of moving towards disarmament or accepting any form of international governance over their nuclear weapons. There are also questions about double standards: Pakistan, India and Israel enjoy a much greater level of acceptance of their possession of nuclear weapons than does North Korea. (The double standards of Western states which essentially accept Israel as a *de facto* nuclear-weapon state while noisily complaining about North Korea's nuclear weapons and Iran's alleged nuclear programme, are particularly glaring.)

In addition, there have been, and continue to be, concerns over potential cheating by NPT non-nuclear-weapon states parties. The discovery of Iraq's nuclear programme in the 1980s led to a major upgrade of the IAEA's safeguards system in order to be able to detect similar activity in future. North Korea, originally a party to the NPT, left the treaty in controversial circumstances in 2003 and proceeded to develop and test nuclear weapons. And a major international drama over alleged nuclear weapons activity in Iran continues to this day.

But while these cases dominate the news and the attention of certain governments, they involve only a tiny proportion of the membership of the NPT and the world's states; overall, the treaty has an impressive record of preventing proliferation.

It is a different story, however, for the disarmament provisions of the NPT. Article VI of the treaty obliges all parties to 'to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament'.⁵ Put bluntly, this has not been done. Over the past five decades, the five nuclear-weapon states have consistently dragged their feet, made excuses, resisted steps towards implementation, and simply ignored commitments they had made in the course of the five-yearly review conferences of the treaty.

Two factors have contributed to this situation. The first, and most significant, is that the disarmament obligations set out in Article VI of the NPT have no time limit beyond the vague and essentially meaningless phrase: 'at an early date'. The nuclear-weapon states therefore can claim to be in compliance with Article VI as long as they are doing something, however nebulous and insubstantial, in the general direction of its implementation. This is an inherent and fundamental flaw in the treaty, as it makes it impossible to assess, in a legal sense, if the essential bargain embodied in the treaty—i.e., non-acquisition of nuclear weapons in exchange for nuclear disarmament—is being kept.

The second factor is the existence of around 30 non-nuclear-weapon states which, although prohibited from possessing nuclear weapons themselves, are in military alliances with nuclear-weapon states and depend on nuclear weapons as a component of their national security (i.e., they are under a 'nuclear umbrella'). These include the NATO member states, as well as U.S. allies Australia, Japan and South Korea. Many of these countries are wealthy, influential and active and effective in multilateral diplomacy. They have typically been key actors in achieving other disarmament treaties, but on nuclear weapons, they have no more interest than the nuclear-weapon states themselves in seeing

Article VI of the NPT actually implemented. They, therefore, support the procrastination and foot-dragging of the nuclear-weapon states, advocating vague and/or ineffective measures to advance disarmament and resisting any initiative that might require action or accountability.

Unsurprisingly, the non-nuclear-weapon states parties to the NPT have grown increasingly frustrated, as it has become clear that the nuclear-weapon states have no intention of taking serious steps towards disarmament and are modernising, and in some cases expanding, their arsenals. This frustration was among the factors leading to the creation of a new treaty, the 2017 Treaty on the Prohibition of Nuclear Weapons (TPNW). This treaty imposes a comprehensive prohibition on nuclear weapons, analogous to the prohibitions of the BWC and CWC. In the words of proponents of the treaty, it thus ‘fills the legal gap’⁶ in the regime governing WMD, putting nuclear weapons on the same international legal footing as biological and chemical weapons.

The TPNW was, and still is, fiercely resisted by all the nuclear-armed states, as well as the states that are in nuclear alliances with nuclear-armed states (see, for example, NATO 2020). The treaty was developed on the humanitarian principles and norm-building approach that also provided the basis for the 1997 Antipersonnel Mine Ban Convention and the 2008 Cluster Munitions Convention, as opposed to the transactional arms control approach of traditional WMD treaties. It entered into force in 2021 and so is still in the very early stage of implementation. Thus, it remains to be seen how effective it will be in shaping a more robust and unequivocal global norm against nuclear weapons and in driving actual disarmament (Lennane and Moyes 2021).

Biological Weapons

For a short, simple treaty with no enforcement or verification measures, the BWC has proved highly successful in building a strong global norm against biological weapons. Although its membership at 184 states parties is not universal, and slightly lower than that of the NPT, its normative impact is such that no government today would claim that biological weapons are a legitimate means of defence. This is a major change from the 1950s and 1960s when biological weapons were just another option in the strategic arsenals of the Cold War superpowers and several other countries. Clandestine biological weapons programmes may still exist, but they are clandestine for a reason: governments know that discovery would bring universal condemnation and significant consequences.

But there are other challenges. The lack of any kind of formal verification machinery remains a problem. There is no standing capacity to investigate allegations of violations of the BWC, nor is there any kind of routine monitoring of biological facilities. Since the September 11 attacks in the United States in 2001 and the anthrax letters incident that followed soon after, governments have grown increasingly concerned about the risk of biological weapons being acquired and used by terrorists. This concern has been further fuelled by the huge and rapid growth in biological science and technology, which potentially allows biological weapons to be made in many more places, at much less cost and with fewer highly trained people. A multilateral treaty like the BWC is a ponderous instrument with which to confront and manage these risks (see also the section on non-state actors later in this chapter).

A further problem is that the scope of the treaty is limited to weapons; it does not deal with other biological risks, such as accidental releases of pathogens or naturally occurring outbreaks of disease. This is an artificial separation, as pathogens neither know nor

care whether they are naturally occurring, accidental or deliberate. In many scenarios, it will not be known at the outset whether a biological weapon has been used. Coordination of an international response and cooperation between security and public health agencies are complex and politically sensitive issues.

Chemical Weapons

In several ways, the CWC represents the zenith of multilateral disarmament treaties. Negotiated during a propitious geopolitical window following the collapse of the Soviet Union, it is an ambitious, potent and elaborate treaty that would be extremely difficult to replicate in today's international environment. Its normative effect has been similar to that of the BWC; no government is willing to admit to possession or use of chemical weapons (although some are nevertheless prepared to use them). The CWC's extensive verification system provides for regular on-site inspections of chemical facilities that could be misused for chemical weapons production, as well as 'challenge inspections' to investigate allegations of non-compliance. Inspections are conducted by OPCW experts, who are full-time professionals, well-equipped and well-trained and able to be deployed at short notice. OPCW experts also oversee and verify the safe and secure destruction of chemical weapons stockpiles of states joining the treaty, a process that is now almost complete.

In recent years, the use of chemical weapons in the war in Syria has prompted much discussion over the effectiveness of the CWC and the durability of the global norm against possession and use of chemical weapons. While the situation has certainly thrown up operational and other challenges for the OPCW and political headaches for CWC states parties—and is yet to be resolved to anyone's satisfaction—it has if anything only demonstrated the strength and global permeation of the norm. The various parties may trade accusations over who is responsible for chemical weapons use, but none attempt to argue that such use is legitimate or excusable in any way (e.g., that it was dictated by military necessity, was a response to extreme circumstances, or was some kind of 'fog-of-war' mistake). All rebuttals from alleged users are based either on claims that chemical weapons were not in fact used or on claims that they were used by someone else. In other words, the controversy is conducted entirely within the bounds of the norm, despite the context of a long, brutal and chaotic intra-state conflict.

As to the effectiveness of the CWC, it is important to recall that at the time of the first alleged use of chemical weapons in the war, Syria was not a party to the treaty. Despite this, the international response was—by the admittedly modest standards of multilateral disarmament action—robust and decisive: an ad hoc UN-OPCW investigation was conducted in the midst of an active conflict, and Syria was strong-armed into joining the CWC (Arms Control Association 2020).

Non-State Actors

Given that the WMD treaties were not designed to deal with non-state actors, their states parties have in fact made a surprisingly successful effort to adapt them to this purpose. The respective review processes of the NPT, CWC and BWC have, in different ways, adopted measures to improve and develop national implementation mechanisms so that they form effective barriers against non-state actors acquiring WMD. Many of these measures dovetail with—and often were developed in coordination with—measures

taken pursuant to Security Council Resolution 1540. In addition, enforcement options against non-state actors were significantly boosted in 2010 and 2017 with amendments to the Rome Statute of the International Criminal Court explicitly defining the use of chemical and biological weapons, respectively, as war crimes under Article 8 of the Statute.⁷

Nevertheless, the system is unquestionably jury-rigged, and gaps and weaknesses abound. National implementation measures vary hugely from country to country in terms of scope, comprehensiveness and effectiveness. Capacity and resources are a constant problem, especially for the BWC, which lacks an international organisation analogous to the IAEA and OPCW, both of which conduct extensive and structured activities to help states parties enact and strengthen their national measures. Coordination among the three WMD treaties and UNSCR 1540 is ad hoc and haphazard, although it does happen to a degree. Currently, the Rome Statute does not explicitly include the use of nuclear weapons as a war crime (although most of the plausible scenarios for the use of nuclear weapons would constitute war crimes under various other provisions of Article 8).

New and Emerging Technologies

New technological developments present novel and largely unanticipated challenges for the international legal regime governing WMD. The prospect of autonomous weapons or delivery systems and the integration of artificial intelligence capabilities into command and control systems for nuclear weapons raise a range of difficult and frankly frightening questions about the degree of human control over the use of WMD, new and unpredictable failure modes, and legal accountability (Boulanin *et al.* 2020; Kallenborn 2022). Many of these issues have been explored with respect to conventional weapons, notably through expert group meetings held under the UN Convention on Certain Conventional Weapons on lethal autonomous weapon systems (popularly referred to as ‘killer robots’), but they have yet to be formally considered within the review processes of the WMD treaties.

Similarly, the ever-increasing prevalence of cyberattacks by both governments and criminals raises the prospect of creating new avenues for triggering the use of WMD or for creating improvised WMD. For example, detection and warning systems could be manipulated to signal a non-existent nuclear attack, triggering mass panic at least, or nuclear retaliation at worst. Or control systems of maximum containment biological laboratories could be sabotaged in order to cause the release of a dangerous pathogen.

Since both these phenomena exist outside the WMD themselves—it is the interaction with WMD that is the problem—the WMD treaties with their limited scope are poorly adapted to respond. A further challenge for treaty-based governance is the fact that much of the technology concerned is in the hands of non-state actors, both legitimate (such as the large private-sector technology corporations) and illegitimate (such as cybercrime organisations). National government capacity for oversight and control is limited, and intergovernmental efforts even more so.

Lessons and Recommendations: WMD Governance in the 21st Century

Any attempt to draw lessons from the existing WMD governance arrangements must begin from the obvious conclusion that things could be much worse: nuclear weapons have not been used in warfare since 1945; proliferation of nuclear weapons has been

restricted to only nine states; robust legal prohibitions and global norms exist against biological and chemical weapons; chemical weapons are further controlled by an effective international verification system. WMD have not been used by terrorists, and as far as is known from publicly available sources, there have been few, if any, attempts to develop or acquire them that had serious prospects of success.

Still, the risk of global catastrophe remains. The principal and most imminent risk comes from nuclear weapons, with a considerably lesser but still potentially significant global risk from biological weapons. What then needs to be done? What weaknesses in WMD governance need to be addressed in order to better manage the risks and how can this be most effectively pursued in the current geopolitical circumstances?

Correcting Preserved Ambivalence: 'Normalising' WMD Norms

One lesson derives from the observation of the difference between the norm against nuclear weapons and the norms against biological and chemical weapons. As noted earlier, the global norms that have emerged through the adoption and implementation of the BWC and CWC over several decades are robust and absolute: biological and chemical weapons are beyond the pale, 'repugnant to the conscience of mankind', as the preamble to the BWC elegantly puts it, and no government will defend them (at least in public). But the norm on nuclear weapons that has emerged through the NPT and the associated regulatory regime is distinctly different and indeed self-contradictory. On the one hand, nuclear weapons, like the other WMD, are dangerous and unacceptable. Therefore, non-nuclear-weapon states must not have them. On the other hand, nuclear weapons are permitted, at least *ad interim*, by the NPT for the five nuclear-weapon states, and these states regularly and persistently insist that their nuclear weapons are both legitimate and necessary for their own national security and for international stability.

As the NPT and its ecosystem have developed over the decades into the 'cornerstone' of global nuclear weapons governance, this normative ambivalence has become embedded and proved to be a major obstacle to progress on nuclear disarmament. After all, if nuclear weapons are legitimate and necessary, why would a state want to get rid of them? (Curiously, this question is almost never asked of the NPT nuclear-weapon states.) A psychologist observing the behaviour of the nuclear-weapon states over the course of the NPT review process in the last 50 years would be bound to conclude that they are engaged in the task of avoiding doing something they desperately don't want to do while trying to appear as if they are in fact doing it.

The solution must be to resolve this preserved normative ambivalence: to 'normalise the norm' against nuclear weapons by aligning it with the norms against biological and chemical weapons. Fortunately, the means of doing this has already been developed: the TPNW. Developing an unambiguous and absolute global norm against nuclear weapons was a key objective of the proponents of this treaty. Indeed, this is the only way to understand the purpose and functioning of the TPNW, as it makes little sense as a 'traditional' WMD disarmament treaty if none of the nuclear-armed states joins it—and all have resolutely stated their intention not to.

The idea is that as membership of the TPNW grows, and as implementation activities expand, the norm it embodies will gradually take hold—just as the analogous norms did in the case of the BWC and CWC. While the involvement of nuclear-armed states in this process would certainly help, it is not necessary. This is a key advantage of the

humanitarian approach to disarmament, which makes no distinction between possessors and non-possessors of the weapon in question and thus empowers many states which would otherwise have little influence in the diplomatic process (Lennane and Moyes 2021).

Developing WMD Governance Networks

A second lesson that emerges is that the inevitably inflexible and cumbersome nature of a governance system, based principally on national governments acting collectively through multilateral treaties, imposes unavoidable limitations on its effectiveness and, especially, on its capacity to adapt to new developments and rapid changes. As discussed earlier, the current WMD governance system provides a reasonably sound legal and normative base, but modifying it to remedy shortcomings, or to address new challenges, is slow, difficult and often impossible. A case in point is the attempt to negotiate a protocol to strengthen the BWC with CWC-like verification provisions, which dragged on for eight years before collapsing in failure in 2001 (Littlewood 2005).

Similarly, the fact that the system is state based, with non-state actors involved only peripherally, as and when permitted by the states, further limits its capacity and flexibility. This is particularly the case when key technologies driving the evolving risks are largely in the hands of non-state actors, typically the private sector and/or the scientific community. Again, biological weapons provide a good example here: the extraordinary advances in biotechnology in recent years have largely taken place outside government. Effectively managing the risks associated with these advances requires the support and active involvement of the biotechnology and pharmaceutical industries, scientific and professional bodies and academia, among others. As then Secretary-General of the United Nations, Ban Ki-Moon said in 2008,

Governments alone cannot confront the risks posed by biological weapons ... to manage the full spectrum of biological risks, you need a cohesive, coordinated network of activities and resources. Such a network will help to ensure that biological science and technology can be safely and securely developed for the benefit of all.

(Ban Ki-Moon 2008)

Another obvious area where a network approach is needed is in managing the risks associated with the interactions of cyber- and hybrid warfare with WMD, especially nuclear weapons.

Governance networks also have much to offer in terms of improving the implementation and enforcement of the existing WMD regime. As the explosion in open-source intelligence has illustrated, many of the compliance-monitoring and verification techniques once only available to governments and intergovernmental organisations (such as the IAEA and OPCW) are now in the hands of civil society organisations, private-sector corporations and individual citizens. It is possible, even likely, that such independent verification and investigative means will become even more capable than the 'official' treaty mechanisms. We can envisage, for example, a situation where the result of an OPCW investigation of alleged use of chemical weapons is compared and contrasted with a parallel independent investigation carried out using remote sensing, satellite imagery, drone surveillance, video evidence, and witness testimony collected via social media, and even on-site sample collection and analysis.

The idea of network-based governance is not new and, indeed, already operates in other fields. Anne-Marie Slaughter wrote in 2017 that the only way to manage many global challenges is

to leave the realm of traditional law and politics and to design, build, and manage regional and global networks. These networks can include government officials, particularly at the sub-national level, such as governors and mayors, but must also engage corporate and civic actors.

(Slaughter 2017)

She went on to describe an example of such a network, the Global Covenant of Mayors for Climate and Energy, which ‘connects and mobilises government and nongovernment actors in more than 7,100 cities across the world, all of whom will continue implementing the Paris climate agreement regardless of what national governments do’.

How can such networks be built for WMD governance? And should they be built or left to emerge on their own? Would they be integrated with the WMD treaty system or operate parallel to it? How would they be run, and how would they be accountable?

There are many possible answers to these questions, and certainly, they should be widely discussed. But one big advantage of network-based governance is that it is not necessary to know all the answers—or to secure global consensus—before getting started. Neither is it necessary to invest huge resources or create new international bureaucracies. The network approach lends itself both to experimentation and to natural selection. All that is needed to initiate a new element of a governance network are motivated stakeholders, technical capability and funding. Initiatives that prove effective and useful will attract broader support and additional funding, and perhaps be absorbed or integrated into official treaty mechanisms. Those that fail to deliver will fade into irrelevance or wither away completely.

An existing example of an ad hoc governance network that has emerged essentially spontaneously and is largely self-organising can be found around the BWC. As noted earlier, the BWC’s effectiveness in managing catastrophic biological risks is constrained by its scope being limited to weapons and by its focus being state, rather than non-state, actors. Following the collapse of the protocol negotiations in 2001, BWC states parties established a process of annual expert meetings to address specific aspects of implementing the treaty. This was originally intended as a stop-gap measure pending the resuscitation of the protocol negotiations. But it was soon found to be a surprisingly effective mechanism of engaging non-state actors—i.e., intergovernmental organisations such as the World Health Organization, the World Organisation for Animal Health, the Food and Agriculture Organization, Interpol, international and regional scientific and professional bodies, and the biotechnology and pharmaceutical industries (Lennane 2006).

Conclusion: Getting the Ball Rolling

Improving WMD governance is not a matter of pursuing new global treaties, much less a single WMD treaty to rule them all. Nor is it a matter of discarding, deprecating or neglecting the various elements of the existing system, whatever their limitations. The ingredients for better WMD governance are all there. Perhaps with hindsight, they could have been better designed in both themselves and in the way they fit together, but their advantages far outweigh the likely costs of trying to replace them wholesale or even of trying to amend them. The geopolitical conditions that enabled their creation no longer

exist. In the circumstances, they are ‘good enough’. The tools and elements needed to improve them also exist and can be seen in operation in various other fields. The challenge, then, is selecting and applying the right tools in a starkly divided and contentious global political landscape for disarmament.

There are opportunities for smaller states, working in coalitions, and for other actors—civil society, the private sector, the international scientific community—to get things started. A global consensus is not required. In contrast to, say, climate change governance, WMD governance can be improved piecemeal, with small increments, and gradually woven into what the International Committee of the Red Cross once aptly described as a ‘web of prevention’ (ICRC 2003). By continuing to work on strengthening WMD norms (especially the deficient norm on nuclear weapons) and by developing WMD governance networks in various forms, the global catastrophic risks posed by WMD can be steadily reduced. Such a varied and amorphous governance system will never be elegant or neat. But it can be effective, even in times of instability and conflict. Over time, it can also pave the way for more fundamental structural and systemic reforms, such as revisions to the UN Charter. It should, therefore, be pursued.

Notes

- 1 For a comprehensive overview of the extent and variety of the consequences, see Federal Ministry for Europe, Integration and Foreign Affairs (Austria) 2015.
- 2 For a concise overview of the history of efforts to outlaw and eliminate chemical weapons, see the history page, OPCW (n.d.).
- 3 For the purposes of the treaty, the NPT defines a *nuclear-weapon state* as a state ‘which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967’. India, Israel and Pakistan do not meet this definition, so cannot join the NPT as nuclear-weapon states. They refuse (so far) to join as non-nuclear-weapon states, as this would require them to eliminate their nuclear weapons. North Korea originally joined the NPT as a non-nuclear-weapon state but withdrew from the treaty in 2003.
- 4 SALT I was concluded in 1972, SALT II in 1979. START I was concluded in 1991, START II in 1993 (but never entered into force) and New START in 2010.
- 5 Article VI in its entirety reads: ‘Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control’ (IAEA 1968).
- 6 ‘Fill the legal gap’ became something of a rallying cry for those advocating for the creation of the TPNW; the phrase came to prominence in the Humanitarian Pledge adopted at the 2014 Vienna Conference on the Humanitarian Impact of Nuclear Weapons (Federal Ministry for Europe, Integration and Foreign Affairs (Austria) 2015).
- 7 Article 8 (b) (xviii) defines as a war crime ‘Employing asphyxiating, poisonous or other gases, and all analogous liquids, materials or devices’ and Article 8 (b) (xxvii) defines as a war crime ‘Employing weapons, which use microbial or other biological agents, or toxins, whatever their origin or method of production’ (IAEA 1968).

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