

# The Treaty on the Prohibition of Nuclear Weapons (2017)

## Part I: Universalisation and national implementation

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The Treaty on the Prohibition of Nuclear Weapons (TPNW) entered into force on 22 January 2021, 90 days after it gained the requisite 50 instruments of ratification or accession by states and three and a half years after it [opened for signature](#) on 20 September 2017. It is now legally binding for its States Parties, who are under an obligation to implement its provisions.

### Universalisation

Article 12 contains a notable obligation for states to promote universalisation of the Treaty. States Parties have executed this by making [statements of support](#) for the Treaty at the United Nations (UN) and urging other states to ratify it, consistently voting in favour of the annual UN General Assembly resolution on the TPNW and hosting [events](#) to encourage other states to join the Treaty. Moreover, the Treaty continues to gain support. It currently has 54 States Parties, and a further 34 states have signed but not yet ratified. While 122 states voted in favour of the adoption of the TPNW in 2017, 130 voted in support of the Treaty in the 2020 UN General Assembly [Resolution](#) on the TPNW. Its rate of adherence has been largely [consistent with those of other Weapons of Mass Destruction \(WMD\) treaties](#): three and a half years after they opened for signature, the Biological Weapons Convention (BWC) had 56 ratifications and the Chemical Weapons Convention (CWC) had 57. The Comprehensive Test Ban Treaty (CTBT) had 55 ratifications, however, the TPNW has fallen behind the Nuclear Non-Proliferation Treaty (NPT) which had 66.

However, 42 states remain opposed to the Treaty, including all nuclear-armed states and US nuclear umbrella states, posing a significant challenge to universalisation. These states have made their positions clear through boycotting the TPNW negotiations in 2017 and voting against it in subsequent UN General Assembly resolutions. In a December 2020 [statement](#), NATO's North Atlantic Council explained its member states' opposition to the Treaty on the basis that it risked undermining the NPT, as the "the only credible path to nuclear disarmament" and the wider "non-proliferation and disarmament architecture"; the statement also noted that the TPNW does not reflect the "increasingly challenging international security environment".

The International Campaign to Abolish Nuclear Weapons (ICAN) reports that the Covid-19 pandemic has inevitably impacted some states' efforts to sign or ratify the Treaty, as states have had to prioritise their pandemic responses. Moreover, pandemic-related restrictions in place at the UN Headquarters prevented signature of the Treaty for [several months](#). It is worth noting that fewer states have signed the TPNW since it opened for signature than other WMD treaties: the CWC had [109 signatures](#) and the BWC 160 after the same amount of time. Furthermore, unlike the CWC, BWC and NPT, states can still sign (and ratify) the TPNW after it has entered into force.

Certain important dates have prompted spikes in Treaty ratification and accession. For example, in both 2018 and 2019, nine states ratified the Treaty on 26 September, the International Day for the Total Elimination of Nuclear Weapons. None did so on that date in 2020, however, this may have been due to the impact of the pandemic. Adherence has also coincided with the anniversaries of the atomic bombings of Hiroshima and Nagasaki on 6 and 9 August 1945 respectively, with countries drawing upon the significance of the date in their [advocacy efforts](#) calling for other states to ratify the Treaty. Honduras' ratification as the 50<sup>th</sup> state, triggering the TPNW's entry into force, coincided with the 75<sup>th</sup> anniversary of the UN and followed ratifications by Jamaica and Nauru one day earlier. Since the Treaty has entered into force and as pandemic restrictions subside, more states may prioritise membership.

## Implementation

Once they become a State Party, states are required under Article 5 to adopt national measures to implement their Treaty obligations. Article 5(2) touches upon prohibitions, requiring States Parties to prevent any prohibited activities by persons or on territory under their jurisdiction and control through the introduction of legal and administrative measures as well as the imposition of penal sanctions. This entails ensuring that national legislation criminalises the prohibitions outlined in Article 1, including the development, testing, manufacturing, transfer and use of nuclear weapons, and assisting, encouraging or inducing anyone to engage in activity prohibited under the Treaty, amongst other activities. States Parties are also prohibited from allowing nuclear weapons to be stationed, installed or deployed within their territory (Article 1.1.g).

In addition to the requirement in Article 5, measures are also required to implement other positive obligations of the Treaty. Article 6, for example, outlines obligations for victim assistance and environmental remediation, applicable to individuals and areas under States Parties' jurisdiction and control. In this regard the TPNW more closely resembles the 2008 Convention on Cluster Munitions and 1997 Anti-Personnel Mine Ban Convention, which contain similar provisions and are also based on principles of humanitarian disarmament. Nuclear weapons are situated within the WMD category, however, and other key WMD treaties such as the BWC and CWC, by contrast, do not contain obligations for states to provide such assistance or remediation.

The TPNW specifies several forms of victim assistance, ranging from medical care to psychological support and social and economic inclusion, but does not detail how states should approach implementation. [Practical steps](#) may include formulation of a national action plan and allocation of a budget. Regarding environmental remediation, the Treaty requires States Parties to take 'necessary and appropriate measures' without further detail. Implementation of Article 6 is likely to require further elaboration at future Meetings of States Parties, the first of which must occur within one year of entry into force of the Treaty (Article 8.2) and has been [confirmed](#) to take place in Vienna from 12-14 January 2022.

States may find it useful to undertake assessments of their existing legal framework to determine its compatibility with the TPNW and inform decisions to amend or introduce new laws to implement its provisions. For example, although not a signatory or state party to the TPNW, the Netherlands conducted such an [assessment](#) in 2019. For states which decide to enact new legislation to implement the treaty, the International Committee of the Red Cross has drafted a [model law](#) intended for states to use as a helpful reference document. Ireland is an example of a country which introduced dedicated legislation specifically to implement the TPNW, enacting the [Prohibition of Nuclear Weapons Act](#) in 2019.

Other states have also adopted laws prior to the TPNW which are nevertheless relevant to the obligations it contains. The [New Zealand Nuclear Free Zone, Disarmament and Arms Control Act](#) of 1987, for example, implements New Zealand's obligations as a State Party to a nuclear-weapon-free zone treaty and prohibits acquisition, stationing or testing of nuclear explosive devices, amongst other activities. Mongolia, although not a State Party to the Treaty, has also enacted the [Law of Mongolia on its nuclear-weapon-free-status, adopted on 3 February 2000](#). The law prohibits individuals, legal persons or foreign states from developing, manufacturing, acquiring, stationing or transporting nuclear weapons within the territory of Mongolia (Article 4.1). States Parties may also find that legislation implementing their obligations under the NPT or UN Security Council Resolution 1540 may also be relevant to the TPNW.

The UN General Assembly has expressed its commitment to promoting universalisation of the Treaty in several [resolutions](#). It has also requested in its resolution [72/31](#) that the Secretary-General "render the necessary assistance and [...] provide such services as may be necessary to fulfil the tasks

entrusted to him under the Treaty on the Prohibition of Nuclear Weapons". These tasks include responsibility under Article 8.2 for convening meetings of States Parties and acting as the designated depository of the Treaty under Article 19. Implementation assistance has not yet been mentioned specifically, however, as more states ratify the Treaty, assistance may also be needed or provided on implementation moving forwards.

## Part II. Demonstrating compliance

Angela Woodward, VERTIC

The Treaty's obligations are broken down into negative obligations (relating to nuclear weapons activities prohibited under Article 1) and positive obligations (relating to national implementation, victim assistance and environmental remediation, and international cooperation and assistance under Articles 5, 6 and 7 respectively).

How are States Parties required to demonstrate their compliance with these obligations? The Treaty's requirements for exchanging information among States Parties, through the UN Secretary-General as the Treaty depository, are limited to declarations, under Article 2, on former or current nuclear weapons programmes and the stationing of nuclear weapons on their territory or in any place under their jurisdiction. So, this obligation relates solely to any future nuclear-armed states (even if they have completed disarmament before joining the Treaty) and states that host nuclear weapons on behalf of a nuclear-armed state at the time they adhere to the Treaty. These declarations are a one-off activity, and must be submitted within 30 days of the Treaty's entry into force for a State Party.

Those negative obligations may warrant a significant one-time declaration, given that the manufacture, maintenance or stationing of nuclear weapons necessitates a substantial infrastructure that would have taken years to acquire and much of which would already be in the public domain. Such declarations from current or former nuclear-armed States Parties, or those hosting nuclear weapons, would then trigger the initiation of the Treaty's yet to be defined verification procedures, to determine the verified disarmament of such nuclear weapons programmes and the removal of stationed nuclear weapons. For non-nuclear armed States Parties, compliance with these obligations will be demonstrated by means of a Comprehensive Safeguards Agreement (at a minimum) or, for those States Parties that have concluded one, an Additional Protocol, with the International Atomic Energy Agency, in accordance with Article 3.

However certain negative obligations under the Treaty may warrant ongoing periodic compliance reporting, given the comparative ease and speed with which they may occur, in particular on: the direct or indirect receipt or control of any nuclear weapon or nuclear explosive device; assisting, encouraging or inducing anyone to engage in prohibited activities; and seeking and receiving assistance to engage in such activities (prohibited under Article 1(c), (e) and (f) respectively). For example, a nuclear weapon or nuclear explosive device could, at least in theory, be transferred at sea onto a non-nuclear armed state's flagged vessel, outside the realm of institutionalised nuclear weapons activity monitoring. Of more realistic concern, however, is the risk of non-nuclear armed states providing direct or indirect assistance to nuclear weapons programmes, either intentionally or unwittingly.

Crucially, there is no mandated process for periodic reporting of compliance with the positive obligations. While victim assistance, environmental remediation, and international cooperation and assistance with treaty implementation may be self-evident when it occurs, regular reporting of such information could support the Treaty's object and purpose, such as by further incentivising States Parties to offer and provide such assistance, and demonstrating the Treaty's value and importance. Regular information exchanges on the status of States Parties' national implementation of the Treaty is also necessary to provide opportunities for the demonstration of compliance, and detection of 'technical' non-compliance with national implementation obligations. For discussion on the distinction between technical non-compliance (breaches of national implementation obligations) and substantive non-compliance (gross violations of treaty prohibitions) see [The Biological Weapons Convention: implementing legislation and compliance](#).

More generally, States Parties are committed to meet regularly to consider, inter alia, the implementation of the Treaty, under Article 8 concerning meetings of States Parties. However, the formalities for such meetings are currently being determined and there is currently no process for States Parties to exchange information at such meetings or otherwise periodically under transparency and confidence-building measures or compliance reports, for example, as is the practice under the 1972 Biological Weapons Convention. The First Meeting of States Parties to the TPNW could usefully agree on the value of regular exchanges of information concerning compliance, to be made pursuant to the Treaty, regardless of their

fulfilment of nuclear safeguards obligations for which they are accountable to IAEA Member States and not each other.

### Compliance mechanisms

Compliance concerns may be considered in the biennial meetings of States Parties, extraordinary meetings of States Parties (supported by at least one third of States Parties), or six-yearly Review Conferences provided for under Article 8, or pursued through consultation or the good offices function of the meetings of States Parties under the dispute settlement provisions under Article 11. Further, the UN Secretary-General's 'good offices' function may be invoked pursuant to the UN Charter. In theory, the UN Secretary-General may bring to the attention of the Security Council serious violations of the Treaty which in his opinion may threaten international peace and security, although this is highly unlikely in practice as such activity would more pragmatically give rise to action under the Nuclear Non-Proliferation Treaty (for those states party to that treaty) or otherwise be taken up directly by the Security Council. States Parties are likely to want to resolve compliance challenges, and ensure enforcement and compliance are realised, within the Treaty framework.

### Compliance challenges

Integrating nuclear-armed states and those states which host nuclear weapons of other states into the Treaty will pose compliance challenges. The First Meeting of States Parties will need to consider a process to operationalise an effective verification system for the Treaty, to achieve its universalisation goals.

However, challenges may also arise with regard to compliance with the negative obligations concerning the provision of assistance under Article 1(e). The [Nuclear Weapons Ban Monitor](#) notes that such assistance would include: participation in nuclear-related activities with nuclear-armed states (including nuclear strike exercises, logistical and technical support, intelligence gathering and sharing, participation in nuclear planning, and allowing missile testing) and endorsement of nuclear-weapons doctrines, policies and statements. Of these, the potential for TPNW States Parties to inadvertently, unwittingly, intentionally, or through wilful blindness or negligence, provide logistical and technical support, or intelligence gathering and sharing that assist anyone to engage in any activity prohibited to a State Party under the Treaty, are of growing concern as these are dual-capable activities that may be ostensibly carried out for peaceful purposes. For example, the

entanglement of nuclear weapons complexes in conventional weapons programmes creates opportunities for States Parties to provide assistance to complex and highly sophisticated and classified military programmes that have nuclear weapons-related aspects to them that are beyond their technical understanding, or which might be employed for nuclear weapons purposes after such assistance has been provided.

The Nuclear Weapons Ban Monitor notes that there will not normally be a presumption of military use for assistance provided for dual-use delivery systems. However, the line may be blurred for other technologies such as space-based communication systems (which support peaceful and military uses, potentially including nuclear command and control systems) especially when the end-use application may switch from peaceful to military (nuclear) after the assistance has been provided. The Nuclear Weapons Ban Monitor considers that prohibited assistance is proximate and causal, although States Parties' national implementation measures may prohibit any such assistance, no matter how proximate. This issue warrants further discussion by States Parties, in order to achieve the object and purpose of the Treaty.

The first Meeting of States Parties should address the challenges of ensuring effective national implementation of all treaty obligations and periodic demonstration of compliance within the treaty framework. Given the longstanding partnership between civil society and states in conceiving the treaty, States Parties could usefully collaborate with relevant civil society stakeholders with expertise in these areas to achieve these objectives. As States Parties must also consider how to commence a process to operationalise the verification system provided for in Article 4, it is set to be an eventful meeting.

## In memoriam

In March, VERTIC lost South African colleague, Daan van Beek, due to COVID-19-related complications. We have been working with Daan for a number of years to build the capacity and knowledge of a new generation of nuclear disarmament and non-proliferation experts in countries of the Global South. Daan's passing is a great loss to VERTIC, and indeed to the international disarmament and non-proliferation community. VERTIC offers condolences to his family. He will be sorely missed.

## Verification Watch

### Iran's most recent JCPOA violation highlights role of nuclear technologies and applications

Alberto Muti

Since the beginning of April, the parties to the Joint Comprehensive Plan of Action (JCPOA) have engaged in cautious negotiations in Vienna with the aim of bringing Iran and the United States back into compliance with the 2015 deal. Reports so far indicate that while there is optimism about reaching an agreement, progress has been slow, and results may not come before the Iranian presidential elections, which will take place on 18 June.

Despite a promising start, negotiations were rocked in mid-April by Iran announcing that it would begin enriching uranium up to 60% of fissile isotope U<sub>235</sub>, in retaliation for a sabotage attack on Iran's uranium enrichment plant in Natanz. Iranian authorities accused Israel of carrying out the attack, but Israel neither confirmed nor denied involvement in the Natanz incident. While Iran remained in full compliance with the JCPOA for the year after US withdrawal, it began to incrementally violate the agreement in May 2019. This new enrichment step, which was implemented shortly after the announcement, represents another violation of the JCPOA.

When discussing uranium enrichment, it is important to note that the demand for separative work – the effort and power needed to concentrate U<sub>235</sub> isotopes – is not constant throughout the process. Early stages of enrichment require significantly more separative work; conversely, the higher the starting level, the smaller the amount of separative work required to attain further enrichment. For comparison, enriching uranium to 20% U<sub>235</sub> requires approximately 90% of the separative work that it takes to enrich uranium to 90%, which is considered the threshold for 'weapons-grade' uranium.

Indeed, experts note that the advance in enrichment from 20% to 60% entails a smaller amount of work and progress than the bare figures may suggest. Because of this, some experts have argued that Iran's breach of the JCPOA should largely be taken as a political signal. It has also been noted the work is being conducted at the above-ground PFEP plant in Natanz, and can be easily reversed by downblending the

highly enriched uranium stocks (both 60% and, most likely, the 20% stockpile) to levels of enrichment permitted under the JCPOA.

While these points are largely true, a key concern is that operational experience gained through violations of JCPOA is not, itself, reversible: by taking this step, Iranian scientists and technicians are making progress that could be more easily replicated in the future.

Iran's Supreme Leader presented the move to 60% enrichment by declaring "We are determined to develop our nuclear capabilities in line with the needs of the country", and Iranian authorities have specified that the intended use is the production of Molybdenum-99 for medical purposes. While this could also be achieved in the Tehran Research Reactor (TRR) through the irradiation of targets, this method for production is very inefficient. Moreover, the TRR was modified to use 20% enriched fuel, and it is unclear that higher enrichment is needed – or even safe to use.

While scepticism is warranted about whether these goals require Iran to enrich uranium up to 60%, these statements highlight legitimate claims that Iran has to nuclear technology and its applications. One of the key challenges for the JCPOA – and for any future agreement – is to ensure that Iran's pursuit of legitimate goals does not come at the cost of significant proliferation risks.

Iran has placed much stock on its ability to train nuclear scientists and master nuclear technologies as a factor of internal and international prestige; moreover, and perhaps most importantly, some technologies have important public good applications that would benefit Iran's population, its industrial development and its economic growth. Uses of radioisotopes range from industry to medicine, cancer therapy and medical imaging; Iran has a limited capacity to produce radioisotopes domestically and has generally imported them in the past. This is an area for potential future cooperation, especially as radioisotopes can be produced using particle accelerators, without the need to process fissile material.

The current negotiations over the JCPOA are bound to focus on more urgent issues, including Iran's stockpile of uranium enriched over the JCPOA threshold of 3.67%, the

advanced centrifuges it has produced and deployed since 2019, and possibly unresolved questions about nuclear activities at a number of sites the IAEA visited in 2020. Questions about Iran's nuclear activities and its broader goals, however, remain relevant regardless of the results of the negotiations in the coming weeks.

If the JCPOA can be salvaged, this discussion could start under its terms, for example by examining provision of radioisotope technologies under the agreement's Annex III. This could represent an attractive offer in the medium term, and could help create a path towards a nuclear future for Iran that does not revolve around Uranium enrichment and proliferation hedging.

## Prospects for US-Russian strategic dialogue following New START's extension

Elena Gai

Recent months have seen continuing tensions between the United States and Russia over a range of issues, including Ukraine, the treatment of political opposition leader Alexei Navalny and the imposition of further sanctions on Russia. However, the situation was eased somewhat by a more conciliatory annual [Address to the Nation](#) by President Putin on 21 April. Instead of being dominated by military and defense references, his speech highlighted economic and civil scientific support, infrastructure, demographics, the Covid-19 pandemic and climate change. Putin also stressed that 'Russia once again urges its partners to discuss issues related to strategic weapons possibly to create an environment of conflict-free coexistence'. In [remarks](#) delivered a few days earlier on 15 April, President Biden also struck a conciliatory tone, suggesting that his proposed summer meeting with the Russian President 'could launch a strategic stability dialogue to pursue cooperation in arms control and security'.

Despite the uncertainty throughout 2020 as to whether the New Strategic Arms Reduction Talks (New START) Treaty would be extended, the United States and Russia finally agreed on 3 February to extend the treaty until 4 February 2026. The Treaty limits each side to 800 deployed and non-deployed land-based intercontinental ballistic missile (ICBM) and submarine-launched ballistic missile (SLBM) launchers and deployed and non-deployed heavy bombers equipped to carry nuclear armaments. Within that total, each side can retain

no more than 700 deployed ICBMs, deployed SLBMs, and deployed heavy bombers equipped to carry nuclear armaments. The treaty also limits each side to no more than 1,550 deployed warheads.

New START, which contains detailed procedures for the implementation and verification of the central limits on strategic offensive arms and all the treaty obligations, is currently the only extant bilateral arms control agreement between Washington and Moscow after the collapse of the Intermediate Nuclear Forces (INF) Treaty following US withdrawal in 2019. The Open Skies Treaty is also close to collapse after US withdrawal in November 2020 and Russia's launch of internal state procedures for exiting the Treaty in January.

The proposed June summit between the two leaders represents an opportunity to build on some of the earlier strategic stability dialogue which took place between US and Russian officials in 2020. The agenda could be a full one with a wide variety of potential issues to discuss in addition to nuclear stockpiles, including missile defence, precision guide conventional strike, and developments in outer-space and cyberspace. Such a broad agenda would reflect remarks delivered by both sides around New START's extension. Russian Deputy Foreign Minister Sergei Ryabkov underscored that there is 'a significant amount of time in order to launch and hold profound bilateral talks on the whole set of issues that influence strategic stability', whereas US National Security Adviser Jake Sullivan commented that the extension of the treaty represents 'the beginning of a story on what is going to have to be serious, sustained negotiations around a whole set of nuclear challenges and threats that fall outside of the New START agreement'.

Washington and Moscow could certainly discuss, as a first step, further strategic nuclear weapon reductions for the period beyond 2026, but also set new ambitious targets for other weapons.

Tactical nuclear weapons and their inclusion in an arms control agreement has long been a ' Gordian knot ' proving difficult to cut. US and Russia last addressed deployments of non-strategic nuclear weapons in 1991 when US President George H.W. Bush and Soviet President Mikhail Gorbachev initiated the Presidential Nuclear Initiatives, a set of unilateral but reciprocal initiatives that addressed specific elements of their Cold War arsenals. In 2010, during the New START signing ceremony, US President Barack Obama [hinted](#) at the possibility

of pursuing future discussions with Russia on ‘reducing both our strategic and tactical weapons, including non-deployed weapons’. To date, however, that has not proved possible.

Russia currently maintains an outstanding superiority in non-strategic nuclear warheads whereas the US has a numerical advantage in non-deployed strategic warheads. A possible negotiating option is for the two parties to set an aggregate limit covering all kinds of nuclear warheads. As an initial transparency and confidence building measure both sides could identify the types of weapons and data to exchange in a future negotiation.

In the summer summit, officials might also address precision-guided conventional strike weapons, such as air-and-sea launchers cruise missiles and hypersonic weapons currently under development on both sides. In terms of intermediate-range nuclear forces, options for discussion may include both the 2020 Russian proposal for a verifiable moratorium on the deployment of those missiles that were previously forbidden by the INF Treaty or the elaboration of a proposal for a verifiable ban on nuclear-armed ground-launched and sea-launched cruise and ballistic missiles. Finally, if setting limits on operations in space is a goal out of reach, the exploration of more limited measures may be possible, such as establishing a mechanism to share information on critical space-based early warning and nuclear command and control systems or developing a ban on anti-satellite tests that generate orbital debris. With a wide range of mutual interests in the bilateral relationship, from terrorism to the environment, progress in the strategic dialogue in any of these areas would be a welcome first step.

## The UK’s Integrated Review and changes to British nuclear posture

Anuradha Damale

The UK Government’s ‘[Integrated Review on Security, Defence, Development and Foreign Policy](#)’ was published on 16 March 2021. The review contained the most significant changes to the UK’s nuclear posture in decades.

The UK, which has the fifth largest nuclear warhead stockpile of the nine-nuclear-armed states, is abandoning a self-imposed cap of 225 warheads as well as a reduction target of 180 by the mid-2020s that were first [announced in 2010](#). The new cap will be 260 warheads. The exact size of the current UK nuclear stockpile is not known, but independent estimates suggest that it is around [195 warheads](#), down from a peak of

about 500 warheads in 1974-1981. Just as important are the changes in transparency. The UK will no longer provide any public information on the size of its operational stockpile (previously 120 warheads), or the number of deployed warheads and missiles on submarines (previously 40 warheads and no more than 8 missiles, respectively). Finally, the UK also broadened the criteria for withdrawing assurances that it will not use nuclear weapons against a non-nuclear armed state to include “emerging technologies that could have a comparable impact” (to biological and chemical capabilities).

Reasons behind the changes are [unclear](#), with no single plausible political or strategic motive advanced to date. According to the Integrated Review, these changes are “in recognition of the evolving security environment, including the developing range of technological and doctrinal threats”, and in response to “the changing security and technological environment”. Similarly, the UK Foreign Secretary [said](#) “as the circumstances change and the threats change, we need to maintain a minimum credible level of deterrent”.

However, while the changes appear to have a marginal impact on the credibility of the UK nuclear ‘deterrent’, they seem likely to undermine the UK’s disarmament commitments within the Nuclear Non-Proliferation Treaty (NPT). In a press briefing a day after the publication of the Integrated Review the Spokesperson for the UN Secretary-General [expressed](#) “concern at the UK’s decision to increase its nuclear weapons arsenal, which is contrary to its obligations under Article VI of the NPT”. Similarly, the reduced transparency makes the UK’s verification research and partnerships with non-nuclear weapon states seem like a theoretical exercise rather than indicative of its practical intentions.

## United Nations Open-Ended Working Group agrees recommendations on international cybersecurity

Grant Christopher

A United Nations group has agreed, by consensus, non-legally binding rules of the road in cyberspace. On the 21 March 2021, the United Nations (UN) Open Ended Working Group (OEWG), on Information and Communication Technologies (ICT), established under UN General Assembly (UNGA) resolution 73/27, adopted a [final report](#) by consensus—the first to emerge from this process.

The OEWG is one of two parallel forums at the UN for international cyber governance, the other being the Group of Governmental Experts (GGE). While the GGE convened only a small group of countries, the OEWG was open to all UN member states and participation from Non-Governmental Organisations (NGOs). The development of two parallel fora stemmed from international divisions over the governance of cyberspace, leading to the Russian-backed OEWG and US-backed GGE.

The first cyber GGE was established in 2004 after Russian proposals in the late 1990s for an international treaty restricting military uses of cyber technology were rejected by the United States. After some initial difficulties in reaching consensus, the GGE process achieved consensus reports in 2010, 2013 and 2015. The 2013 GGE report was the first to acknowledge that international law applies in cyberspace and the 2015 report included 11 recommendations for norms and principles of behaviour.

These 11 norms have served as the baseline for subsequent negotiations. They are divided into five norms that limit state behaviour and six norms of good practice. The limiting norms, or 'should not's' discourage targeting critical infrastructure and states harbouring cyber criminals on their territory. The good practice norms, or 'shoulds', encourage cooperation and information sharing between states on cyber-attacks.

Despite this momentum, the 2016–2017 GGE was unable to produce a consensus report due to disagreements between two blocs of countries over the application of international humanitarian law. One group—including Cuba, Egypt, Iran, Russia and Syria, with some support from China—advocated for a new set of norms within an international treaty, while a group of mainly western liberal democracies argued that the existing voluntary, non-binding norms agreed in 2015 were sufficient. A proposal, by Russia, in the following session of the UN, resulted in the establishment of a new OEWG process that further expanded participation from member states and NGOs, and also included private companies such as Microsoft for the first time. Rather than suspending the GGE and switching resources to the OEWG it has continued, as the result of a political compromise, creating an unusual parallel-track process.

One of the main achievements of the OEWG report is the reaffirmation of the 'voluntary, non-binding norms of responsible State behaviour' previously agreed by the 2015 GGE,

as well as the acknowledgement that the forum itself has become an important confidence building measure between states. Discussions about protecting medical and other critical infrastructure from cyberattacks also took place in the OEWG for the first time. The report covers six topic areas: Existing and potential threats; rules, norms and principles for responsible state behaviour; international law; confidence-building measures; capacity-building in ICT; and regular institutional dialogue on ICT. However, the report is short on practical solutions to a number of ICT problems and the application of international law to cyberspace largely remains a contested issue.

The spectrum of capabilities implicitly considered by the OEWG, from blanket WannaCry-type attacks that prey on unpatched commercial software, all the way to a targeted attack on military command and control systems, reflects how cyber-policy is required to address a broad spectrum of capabilities that have very different strategic implications.

The prospect of a cyber-attack sparking a major crisis is growing. Offensive cyber capabilities have rapidly proliferated: in a 2017 [joint statement](#) to the US Senate Armed Services Committee three National Security professionals testified that more than 30 countries were developing offensive capabilities. Despite the adoption of the 11 norms in the 2015 GGE final report (as reaffirmed in the OEWG report), some state-actors have continued to target critical infrastructure in 'grey zone' actions that remain below the threshold for escalation to war. This was the case for the April 2021 attack on Iranian nuclear infrastructure, where claims in public that the damage was caused by a cyberattack may have been used as a cover for a conventional or possibly conventional-cyber hybrid operation. The attack occurred in the context of sustained Israeli-Iranian tensions but did not immediately appear to cause escalation. This supports the notion that cyberattacks targeting critical infrastructure are becoming more viable in grey-zone conflicts.

The OEWG process was the first to include NGOs and private companies. This is especially relevant in cyber governance where large multinational companies play a critical role in developing and maintaining internet architecture. This more inclusive process and the ability to produce a consensus final report is a major step forward. Yet, a legally binding international cyber regime that includes monitoring and verification remains a distant prospect—from either forum. That, of course, was not considered to be a realistic outcome of the recent process.

## 30<sup>th</sup> anniversary of South Africa's accession to the NPT: potential lessons in verification

Noel Stott

On 10 July 1991, South Africa acceded to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) as a non-nuclear weapon state and on 16 September 1991 entered into a Comprehensive Safeguards Agreement with the International Atomic Energy Agency (IAEA). Less than three years later, in March 1993, the country's leaders announced that the country had possessed six nuclear explosive devices as a limited nuclear deterrent.

South Africa remains the first—and so far, the only—state that changed from a *de facto* nuclear armed state<sup>1</sup> to a non-nuclear weapon States Party to the NPT.<sup>2</sup> It is also the only country to have requested the IAEA to confirm that it had terminated the programme in a verifiable and irreversible manner.

A relatively large number of articles and books have been written on South Africa's nuclear weapons programme. Most have focused, *inter alia*, on why the programme was initiated, and why, just prior to the holding of the country's first democratic elections in May 1994, it was terminated. Possible motivations such as the end of the Cold War, the role of individual leadership, international pressure and the escalating expense of the programme have been postulated.<sup>3</sup>

In addition, analysts have attempted to draw lessons from the South African case to illustrate general proliferation concerns currently facing the world, in particular, whether the South African process could serve as a 'roll-back' model for North Korea.<sup>4</sup>

Given that both the programme's development and its dismantlement was conducted under a cloud of 'secrecy', even today, thirty years later, '... a deeper examination of the South African case raises a number of questions. . . of just how irreversible and transparent the South African disarmament was and how this might complicate current "getting to zero" efforts.'<sup>5</sup>

Notwithstanding such negative assertions, the South African story's larger significance derives from the country's unprecedented unilateral dismantling of the programme and its verification by the IAEA.

Unfortunately, not much has been written on the dismantlement process and the IAEA's verification that South Africa's submissions were indeed complete and correct—especially by 'insiders'. Nic Von Wielligh's *The Bomb: South Africa's Nuclear Weapons Programme*<sup>6</sup> remains the most comprehensive account as the author was responsible for ensuring that South Africa met all its obligations under the statutes of the IAEA.

From the review of currently available literature, there is a dearth of publicly available information specifically on the technical aspects of the dismantlement process and of the verification procedures employed both internally by Professor Wynand Mouton and by the IAEA.

Further research is required on the verification and the completeness investigations by the IAEA as this aspect is, in many respects, more important than studying the South African case as an example of non-proliferation success. As stated by the Nuclear Threat Initiative, it would 'be helpful if South Africa were prepared to develop a report on its experience of having the equivalent of a baseline declaration verified and if the IAEA, in consultation with South Africa, reported on its perspective on the lessons from the South African experience'.<sup>7</sup>

South Africa's nuclear disarmament provides the only practical experience of attempting to verify the quantity of fissile material produced in an enrichment programme operating outside of international safeguards. Interrogating the technical aspects of the dismantlement may identify possible processes and lessons that may be applicable in future unilateral or multilateral disarmament initiatives.

The South African case may also be illustrative of the degree of confidence that the international community may likely need to be satisfactorily persuaded that a nuclear arsenal has been completely eliminated. Such research could feed into the group of governmental experts (GGE) established under the UN General Assembly Resolution **A/RES/74/50**, which is due to meet in November 2021 and in 2022, to consider nuclear disarmament verification issues.

## Endnotes

1. According to David Albright ('South African and the Affordable Bomb', *Bulletin of the Atomic Scientists*, July/August 1994, p. 37), each of the six gun-type weapons, weighed approximately one ton, had a diameter of 0.65 m, a length of 1.8 m and contained about 55 kg of weapon-grade uranium (WgU) with an estimated yield of 10-18 kilotons. In a gun-type design, one sub-critical piece of WgU is fired down a gun barrel into another subcritical piece to create a supercritical mass in which a neutron chain reaction is then initiated.
2. South Africa is unique in this sense as Ukraine, Belarus and Kazakhstan transferred Soviet nuclear weapons on their territories to the Russian Federation while other countries such as Iraq, Iran, Libya and Sweden [only] had nuclear weapon programmes at various stages of development before their termination.
3. See for example: Stephen F. Burgess, South Africa's Nuclear Weapons Policies, *The Nonproliferation Review*, Volume 13 Issue 3 2006; Maria Babbage, White Elephants: Why South Africa gave up the Bomb and the Implications for Nuclear Nonproliferation Policy, *Journal of Public and International Affairs*, Volume 15/Spring 2004; Terence McNamee, The Afrikaner Bomb: Nuclear Proliferation and Rollback in South Africa, *IFS Info* Issue 2 2005; J.D.L. Moore, *South Africa and Nuclear Proliferation: South Africa's Nuclear Capabilities and Intentions in the Context of International Non-Proliferation Policies*, New York: St. Martin's Press, 1987; B. Volders, Nuclear terrorism: what can we learn from South Africa's development of nuclear devices? *Dynamics of Asymmetric Conflict*, vol. 12, 2019, pp. 129 – 147.
4. Examples include: Terence McNamee & Greg Mills, Denuclearizing a Regime: What South Africa's Nuclear Rollback Might Tell Us About Iran, *Defense & Security Analysis* Volume 22, Issue 3, 2006; Liang Tuang Nah, Applying the Lessons of South African Nuclear Disarmament to North Korea, *North Korean Review*, Volume 10, No. 2, 2014, pp. 89–98, [www.jstor.org/stable/43908943](http://www.jstor.org/stable/43908943); Michelle Dover and Zack Brown, For North Korea's Denuclearization, Look to South Africa: And give diplomacy a chance, 4 October 2018, <https://warisboring.com/for-north-koreas-denuclearization-look-to-south-africa/>; Brian Kaper, Understanding the South African Nuclear Experience and its Applicability to Iran, 2008, <https://jpia.princeton.edu/sites/jpia/files/2008-7.pdf>
5. Jodi Lieberman, 'Dismantling the South African Nuclear Weapons Program: Lessons Learned and Questions Unresolved', in Henry D. Sokolski (Editor), *Nuclear Weapons Materials Gone Missing: What Does History Teach?*, Strategic Studies Institute and US Army War College Press, November 2014.
6. Nic Von Wielligh and L. von Wielligh-Steyn, , *The Bomb: South Africa's Nuclear Weapons Programme*. Pretoria: Litera and the Institute for Security Studies, 2015.
7. Nuclear Threat Initiative, 'Innovating Verification: New Tools & New Actors to Reduce Nuclear Risks: Verifying Baseline Declarations of Nuclear Warheads and Materials', July 2014.

## Implementation Watch

### Princeton University fined over exports of pathogens without a licence

Thomas Brown, Associate Legal Officer

On 2 February 2021, the US Bureau of Industry and Security (BIS) announced that it had reached an [administrative settlement](#) in relation to violations of export control legislation by Princeton University. The settlement relates to 37 alleged violations of the Export Administration Regulations (EAR) between 2013 and 2018 by Princeton, when the university was said to have exported various strains and recombinants of an animal pathogen without the required BIS licences to research institutions in 15 countries.

The items in question are included on the US [Commerce Control List](#) (CCL) in Supplement 1 to Part 774 of the EAR, which contains a catalogue of materials that are subject to the

export licensing authority of BIS. The exported pathogens are controlled for chemical and biological weapons purposes and were valued at roughly \$27,000. Under [EAR section 742.2\(a\)](#), a BIS licence was required to export the items to all destinations. However, according to [the charges mentioned in the settlement](#), no licence was sought or obtained for any of the exports in question.

The EAR and the CCL help the United States to implement its obligations under various international instruments, including the Biological and Toxin Weapons Convention (BWC) and UN Security Council Resolution 1540 (UNSCR 1540). Article III of the BWC requires all states parties to refrain from transferring biological weapons to anyone and from assisting, encouraging or inducing anyone to manufacture or acquire them. This must be balanced with the right in Article X of the BWC for states to participate in the fullest possible

exchange of equipment, materials and scientific and technological information for the use of biological agents and toxins for peaceful purposes. The transfer of certain pathogens is controlled therefore, to prevent them from contributing to the development of biological weapons. Further, UNSCR 1540 requires that all states develop export and trans-shipment controls over materials, equipment and technology that could be used for the design, development, production or use of nuclear, chemical and biological weapons and their means of delivery. To implement such provisions, many states have passed legislation which allows national authorities to control such materials. One approach, taken by some states including the United States, is to designate lists of materials that are subject to various international transfer controls, such as licensing requirements. The CCL is informed by the control lists of the Australia Group, an informal multilateral export control regime of which the United States is a member.

Princeton University cooperated with BIS and agreed a settlement agreement pursuant to [section 766.18\(a\) of the EAR](#). Under the agreement, the university agreed to pay a penalty of \$54,000 and to complete internal and external audits of its export controls compliance programme. Princeton further agreed to complete two reports describing enhancements to its compliance with the regulations. The completion of these steps was also made a condition to “the granting, restoration, or continuing validity of any export license, license exception, permission, or privilege granted, or to be granted, to Princeton”.

This scenario is notable because Princeton informed national authorities of the alleged export control violations in question, after concerns were raised during a 2018 training session on compliance with export control regulations. After discovering the problem, the University filed a voluntary self-disclosure with BIS in accordance with [section 764.5 of the EAR](#). Voluntary self-disclosure is considered a mitigating factor in determining administrative sanctions under [section 764.5\(a\) EAR](#) and the eventual penalty was significantly lower than the maximum allowed by law of up to the greater of \$307,922 per violation, or twice the value of the transaction that is the basis of the violation.

This case demonstrates the risks that research institutions face when exporting biological agents and toxins, even for research purposes. Universities often seek to transfer agents and toxins to other institutions for peaceful uses. Without a comprehensive understanding of transfer control legislation,

researchers risk significant administrative or even criminal sanctions. Princeton stated that the exports supported US government funded research within the scientific community. Nevertheless, the potential for such materials to be used for biological weapons purposes means that the agents and toxins in question required licensing regardless of the recipient under [EAR section 742.2](#). BIS evaluates situations on a case-by-case basis, weighing a number of factors to determine whether the export or re-export would risk furthering the development, production, stockpiling or use of chemical or biological weapons.

## VERTIC publishes BWC and CWC legislation survey templates

One of the primary activities of VERTIC’s National Implementation Measures (NIM) Programme is analysis of states’ existing laws and regulations for implementation of the Biological and Toxin Weapons Convention (BWC), Chemical Weapons Convention (CWC) and their related requirements under United Nations Security Council Resolution 1540 (UNSCR 1540). National implementation is a requirement under Article IV of the BWC and Article VII of the CWC. The analysis of existing legislation is important, because it allows states to examine which legislative measures are necessary to fully implement their international obligations. Moreover, it helps ensure that any newly drafted legislation fits within the existing legal framework.

In order to assist states to comprehensively analyse their legislation, VERTIC has developed so-called ‘legislation survey’ templates for the [BWC](#) and [CWC](#) respectively, each taking into account the related obligations in UNSCR 1540 as well as in a number of treaties regarding civil aviation, maritime navigation, terrorism and international crimes. In addition, a ‘survey overview’ template provides a place to summarise the survey’s main findings and formulate recommendations to strengthen legislation.

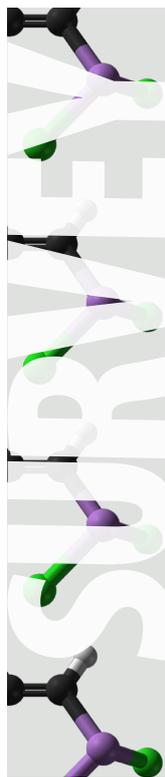
The legislation survey and survey overview templates were first developed after the establishment of the NIM Programme in 2008. They have been adapted over the years and underwent a major revision in 2020. Until now, this legislation survey methodology was kept in-house, but it is hoped that by publishing the legislation survey and survey overview templates, more state officials such as policy offers and legislative drafters and other relevant stakeholders can gain a better understanding



## BWC

Survey Template of National Implementation Measures for the 1972 Biological and Toxin Weapons Convention and biological weapons-related provisions of relevant international instruments

II. LEGISLATION SURVEY	
A. Definitions	
A.1	Biological agent (e.g. ISO 35001:2019, section 3.13 page 3; WHO Guidance on implementing regulatory requirements for biosafety and biosecurity in biomedical laboratories, Annex 1 page 61; WHO Laboratory biosafety manual: fourth edition, Glossary of terms page xi)
A.2	Biosafety* (BTWC Eighth review conference final document Article IV 11(c); e.g. ISO 35001:2019, section 3.22 page 4; WHO Laboratory biosafety manual: fourth edition, Glossary of terms page xi)
A.3	Biosecurity* (BTWC Eighth review conference final document, Article IV 11(c); e.g. ISO 35001:2019, section 3.23 page 4; WHO Laboratory biosafety manual: fourth edition, Glossary of terms page xi)
A.4	Dual-use (e.g. WHO Laboratory biosecurity guidance, page iv; WHO Laboratory biosafety manual: fourth edition, Glossary of terms page xii)
A.5	Explosive or other lethal device (ICSTB, Article 1 (3)*)
A.6	Toxin (e.g. ISO 35001:2019, section 3.15 page 3; WHO Laboratory biosecurity guidance, section 4.2 page 16)
A.7	Non-state actor (UNSCR 1540, Preamble)
A.8	Biological weapon (BTWC, Article I Beijing Convention, Article 2 (b) (ii); SUA 2005, Article 1 (1) (d) (ii); SUA PROT 2005, Article 1 (1))
A.9	Other



## CWC

Survey Template of National Implementation Measures for the 1993 Chemical Weapons Convention and chemical weapons-related provisions of relevant international instruments

II. LEGISLATION SURVEY	
A. Definitions	
A.1	Chemical weapon (CWC, Article II (1); Beijing Convention, Article 2 (b) (ii); SUA 2005, Article 1 (1) (d) (ii); SUA PROT 2005, Article 1 (1))
A.2	Chemical Weapons Convention, or Convention
A.3	Chemical weapons production facility (CWC, Article II (8))
A.4	Consumption (for the purposes of CWC Article VI) (CWC, Article II (12)(c))
A.5	Discrete organic chemical (CWC, VA Part I (4), C-V/DEC.39)
A.6	Dual-use
A.7	Explosive or other lethal device (ICSTB, Article 1 (3))*
A.8	Inspection site (CWC VA Part I (16))
A.9	International inspection (CWC, Article VI (9))
A.10	International inspector (CWC VA Part I (13), (18))

of the specific national implementation measures that can be considered. The legislation survey template for the BWC identifies 137 distinct measures, while the template for the CWC contains 163 such measures.

Moreover, state officials can directly use these tools to assess their legislative frameworks. They can review provisions in their laws, regulations and other pertinent official documents; compare these with the national implementation requirements mentioned in the left-hand column of the survey; and insert relevant national provisions in the appropriate cell in the right-hand column. The result is a gap analysis of existing legislation against the national implementation requirements of the BWC or CWC. State officials can compile their main findings and recommendations on the basis of this analysis in the survey overview. While state officials can use these templates independently, the NIM Programme team remains available for

any assistance during this process. The templates will also be made available in Arabic, French, Russian and Spanish in the near future.

## Retirement

At the end of March, Johann Kellerman, Director for Disarmament and Non-Proliferation at South Africa's Department of International Relations and Cooperation (DIRCO) retired. Johann has always been a supporter of VERTIC's nuclear disarmament verification activities. While we wish him well in his retirement, we are hopeful that he will continue to remain involved in the issue of nuclear disarmament and non-proliferation.

## Compliance Watch

### ICJ can address whether US breached 1955 Amity treaty with Iran

Cristina Rotaru

On 3 February 2021, the International Court of Justice (ICJ) in The Hague ruled that it has jurisdiction to address a claim filed by Iran in July 2018. The claim stated that the United States was in breach of certain provisions of the 1955 Treaty of Amity, Economic Relations and Consular Rights (or Amity Treaty), after it unilaterally re-imposed sanctions on Iran on the back of a withdrawal from the Joint Comprehensive Plan of Action (JCPOA, also known as the Iran nuclear deal) in May of that year (see [Trust and Verify #167](#)). Iran is seeking an order requiring the United States to lift its unilateral sanctions and to pay compensation.

In its claim to the ICJ, Iran alleged that the United States had violated the 1955 Treaty by failing to provide Iranian nationals and companies with fair and equitable treatment, as mandated by Article IV (1) of the 1955 Treaty. That article reads: “Each [. . .] Party shall at all times accord fair and equitable treatment to nationals and companies of the other [. . .] Party, and to their property and enterprises; shall refrain from applying unreasonable or discriminatory measures that would impair their legally acquired rights and interests; and shall assure that their lawful contractual rights are afforded effective means of enforcement, in conformity with the applicable laws”.

The United States, however, maintained that this claim was inadmissible on the basis of the principle of territoriality, which expressly limits the Amity Treaty to conduct that occurs within the territory of the United States.

In October 2018, the court had ordered the United States to ensure that sanctions against Iran did not affect humanitarian aid or civil aviation safety. Then in September 2020, the United States objected to the Court’s jurisdiction to the admissibility of Iran’s claim—an objection that has now been dismissed by the ICJ.

In its [judgement](#), the Court also ruled that Iran was “incorrect in claiming that Article VII, paragraph 1, which prohibits restrictions on the transfer of funds, could apply to the

United States’ measures that affect payments to or from third countries, and not merely to or from the territory of Iran”.

Iran had also challenged the concept of “third country measures” which underlies the United States’ second preliminary objection to jurisdiction. Iran made the case to the ICJ that the US punitive measures were specifically targeted at Iran and Iranian nationals and companies, not at third states or their nationals and companies, citing as evidence the words of the US Department of the Treasury of 5 November 2018, which described the measures at issue as “the toughest US sanctions ever imposed on Iran, [which] will target critical sectors of Iran’s economy”.

The ICJ stated that, on the basis of Article XXI, paragraph 2 of the Amity Treaty, the Court has subject-matter jurisdiction over the nature of the case to entertain Iran’s claim. The decision echoes the terms of a well-known statement issued by the same Court in the Oil Platforms case of 2003, when it found that “Article XX, paragraph 1 (d), [of the Treaty of Amity] does not restrict its jurisdiction in the present case but is confined to affording the Parties a possible defence on the merits”.

Although Iran did not initiate proceedings against the United States for breach of the JCPOA, it has made use of the Amity Treaty as a legal basis for its involvement in an Iranian-US dispute. In total, Iran and the US have faced each other five times before the ICJ.

Although the ICJ’s rulings are binding, the court has no power to enforce them; and the United States and Iran are both among the countries to have ignored its decisions in the past.

The Amity Treaty, which was signed before Iran’s 1979 Islamic revolution and the deterioration in ties with Washington, currently remains in force, despite an [announcement](#) made by former US Secretary of State Mike Pompeo in October 2018 that the treaty would be terminated after the [ICJ ordered](#) access to humanitarian aid for Iran.

As the new Biden administration paves the way for a potential US return to the JCPOA, with nuclear deal participants resuming talks in Vienna towards this end, it remains to be seen whether the ICJ’s latest ruling in Iran’s favour will serve as a bargaining chip at the negotiating table.

## EU designations under the Global Human Rights Sanctions Regime

Cristina Rotaru

The European Union has made its first designations under its new Global Human Rights Sanctions Regime (more on this can be found in the Compliance Watch section of [Trust and Verify #165](#)).

On 2 March 2021 the EU Council announced its [decision](#) to sanction four individuals responsible for “serious human rights violations” in Russia, including acts of arbitrary arrests and detentions, widespread and systematic repression of freedom of peaceful assembly and of association, and freedom of opinion and expression. The named persons were Alexander Bastrykin, Head of the Investigative Committee of the Russian Federation; Igor Krasnov, the Prosecutor-General; Viktor Zolotov, Head of the National Guard; and Alexander Kalashnikov, Head of the Federal Prison Service. All four are said to have played central roles in the arbitrary arrest, prosecution and sentencing of the Russian opposition leader, Alexei Navalny, and were involved in the repression of peaceful protests sparked by his unlawful treatment.

On 22 March, the EU added a further 11 individuals and four entities to the list of designated parties under the sanctions regime. These are said to be responsible for serious human rights violations and abuses in various countries around the world. The targeted measures are directed at persons and entities responsible for large-scale arbitrary detentions of, in particular, Uyghurs in Xinjiang in China, extrajudicial killings and enforced disappearances in Libya, repression in North Korea, torture and repression against LGBTI persons and political opponents in Chechnya in **Russia**, and torture, extrajudicial, summary or arbitrary executions and killings in **South Sudan** and **Eritrea**.

All restrictive measures consist of asset freezes and travel bans. In addition, all EU persons and entities are **prohibited from making funds available** to those listed, either directly or indirectly.

The EU’s human rights sanctions regime is equivalent to the so-called Global Magnitsky Act of the United States, originally signed by President Obama in 2016, which several countries around the world, including Canada and the United Kingdom, have replicated in national legislation.

## UK autonomous sanctions come into force

Cristina Rotaru

As of 1 January 2021, with the end of the Brexit transition period, the United Kingdom is no longer implementing EU sanctions. Instead, UK autonomous sanctions are in force under the Sanctions and Anti-Money Laundering Act 2018 (the Sanctions Act). This legislation has enabled the UK to break away from existing EU sanctions regimes and transition them directly into UK law. The following sanctions regimes are currently in force: Afghanistan, Belarus, Bosnia and Herzegovina, Burma, Burundi, Central African Republic, Chemical Weapons Counter-Terrorism (Domestic), Counter-Terrorism (International), Cyber, Democratic People’s Republic of Korea, Democratic Republic of the Congo, Guinea, Guinea-Bissau, Iran (Human Rights), Iran (Nuclear), Iraq ISIL (Da’esh) and Al-Qaida, Lebanon (Assassination of Rafiq Hariri and others), Libya, Mali, Misappropriation, Nicaragua, Russia, Somalia, South Sudan, Sudan, Syria, Unauthorised Drilling Activities in the Eastern Mediterranean, Venezuela, Yemen, and Zimbabwe. Guidance has been published for [each sanctions regime](#).

In total, 113 entries previously designated under EU sanctions have not been designated in the UK’s own regulations, meaning that they are no longer subject to an asset freeze under UK legislation. The vast majority of these concern government officials and their family members, predominantly from Tunisia and Belarus, Egypt, Guinea-Bissau and Syria. Although no formal reason was provided for these de-listings, the UK Government had [previously stated](#) that the EU sanctions regime offered insufficient grounds in the sanctioning of a person or entity (usually due to a lack of evidence) – a standard the UK appears keen to reform. In a comprehensive [review](#) comparing the existing EU legislation with the new UK legislation, UK Finance, the trade association for banking and financial institutions in the UK, concluded that the UK is able to better “finesse the regimes with language that was not possible via the EU legislation” under its autonomous sanctions regime, resulting in a different evidentiary standard to that of the EU, while a Royal United Services Institute ([RUSI](#)) [analysis](#) on post-Brexit UK sanctions commented that “political priorities in the UK and the EU may diverge on who should be sanctioned”.

In addition to the delistings, the UK reshuffled some designations under a different regime in the UK than the regime

under which they were listed in the EU. However, critics of the UK's sanctions policy, as reported by the [House of Commons Foreign Affairs Committee in 2019](#), have labelled the UK's post-Brexit sanctions strategy as “fragmented and incoherent”, arguing that the FCO has yet a way to go to crack down on the laundering of “dirty money” attracted by the City of London.

The UK's asset freezing regime (UK Freezing Orders) remains in place under the Anti-Terrorism, Crime and Security Act 2001. The UK also continues to maintain a [Consolidated List](#) for all individuals and persons subject to financial sanctions.

On 26 April 2021, the UK [launched](#) a new global anti-corruption sanctions regime, targeting 22 people whom the UK Government suspects are involved in serious corruption. Those designated include 14 Russian nationals; two Indian businesspersons; one Guatemalan official, one Ukrainian national, one South African businessperson, one Sudanese businessperson, one Nicaraguan official, and one Honduran Congressperson.

The UK Government's [Integrated Review of Security, Defence, Development and Foreign Policy](#) stated that the UK will continue to use sanctions to “act as a force for good in standing up for human rights around the world”, and to punish those involved in serious human rights violations and abuses, as well as for “national security diplomacy” reasons. It also announced that in 2021 the UK will launch an autonomous global sanctions regime that will target corruption.

On sanctions post-Brexit, the review says: “Our departure from the EU means we can move more quickly than through multilateral channels where it is in our interests to do so, while continuing to coordinate closely with a range of like-minded partners. We have already demonstrated the agility of our autonomous sanctions: in September 2020, we were the first European country to announce sanctions against the leader of Belarus and several officials over election fraud and violence against protestors”.

## Science & Technology Scan

### An integrated future for UK space policy?

Anuradha Damale

The [Integrated Review on Security, Defence, Development and Foreign Policy](#), (Integrated Review, March 2021) outlines the UK Government's plans for space through “An Integrated space policy: making the UK a meaningful player in space”. The use of ‘integrated’ in the title of the section has been interpreted by experts as a positive step in “[unlocking the full potential of the UK in space](#)”. Both the Integrated Review, and the related [Defence Command Paper](#) (DCP), explicitly promote the UK's commitment to research, development and innovation in the space sector. In tandem with the UK Resolution on [Reducing Space Threats through Norms, Rules and Principles of Responsible Behaviours](#), which was adopted by the UN First Committee last November, the UK Government clearly recognises the value of space to the UK's critical national infrastructure, as well as to its economy. However, the Government's [Defence and Security Industrial Strategy](#) (DSIS), released shortly after the Integrated Review, provided a more muted commentary on the UK space sector. As such, there remains

much ambiguity about the steps to be taken to achieve the goals outlined by the UK in the Integrated Review.

There are several priority areas for space mentioned in the Integrated Review and DCP, with varying levels of detail provided. Two of these are discussed below: commercial launch capacity and space domain awareness.

#### Increasing commercial launch capacity in the UK

The UK Government, through the UK Space Agency, aims to launch British satellites from Scotland by 2022 to “enable a UK-wide market for spaceflight services”. In doing so, the UK should be able to gain “greater strategic autonomy and flexibility” as to what the UK deploys into space, and when. In 2017 the then Science Minister Jo Johnson got the ball rolling by backing a £10 million scheme to “[incentivise the commercial spaceflight market](#)”, and subsequently, development started on spaceport sites in Scotland and Cornwall.

There would be numerous benefits to the UK having an indigenous launch capacity. Currently, the only launch programme in Europe is operated by the European Space Agency,

which carries out launches from South America. If the UK were to become the European centre of space flight, it would stimulate the UK's economy, especially R&D, as well as potentially enable important partnerships to be built with several European countries with a strong interest in space.

However, [geographic location is a key factor in choosing launch location](#) and the proposed sites in Cornwall and Scotland could only support limited missions. Sites located closer to the equator provide a greater boost from the Earth's rotation, and therefore, heavier payloads intended for higher orbits (such as geostationary orbits, used for navigation, weather, and communications), benefit from near-equator launch. In contrast, an indigenous UK space launch site is likely to support only small-satellites and missions to low-earth orbit. Furthermore, several existing companies (such as SpaceX) and government agencies (such as the Indian Space Research Organisation) have already demonstrated the capability to launch small satellites into orbit. It is unclear, therefore, how the UK space sector expects to create a competitive advantage in this increasingly competitive space launch market.

### Space Domain Awareness (SDA)

The [DCP](#) (Section 7.16) states the UK Government's commitment to "(e)nhance our space domain awareness, including the establishment of a National Space Operations Centre, so that we can track, attribute and take action against nefarious activity". While this is a necessary and welcome development, there is little detail as to how and when this UK SDA capability will be developed.

SDA (or SSA, Space Situational Awareness) continues to be a topic of great interest in the space community, [especially given the recent focus on debris incidents](#). Furthermore, SDA has the potential to play an important role in the safety of space-based critical national infrastructure. However, there is still a lack of consensus on what defines 'nefarious activity' within the space sectors. Attribution is a particularly contentious area. The developments in SDA technology itself are moving incredibly quickly, and [are being led by commercial actors](#). In order for the UK to develop a sustainable and competitive SDA capability, it will need to develop a framework for collaboration with relevant UK-based commercial actors.

### A 'force for good'?

The UK is very clearly positioning itself to become a competitive, useful, and attractive player in international space. It has set out a cross-governmental approach that includes the civil, commercial and military sectors, as well as the prospect of working with key allies. However, the path ahead is likely to be increasingly difficult. The prospects of a Covid-19-related global economic downturn adds to the uncertainty. The UK will need to gain trust through transparency and the development of a clear pathway to achieve its integrated place in space.

### AI verification

Grant Christopher

How do you verify the difference between the Terminator and Robocop? One is a machine that targets and kills, the other uses artificial intelligence (AI) for enhanced awareness, but keeps a human in the loop for targeting and killing.

The final report by the United States National Security Commission on AI (March 2021) recommends development of technical means to verify compliance with a future arms control agreement on use of AI in weapons systems. A new report by Matthew Mittelsteadt from Georgetown's Center for Security and Emerging Technology, titled [AI Verification](#) (February 2021) begins this process. Moreover, the verification tools proposed in the report have applications beyond AI verification to software verification in general.

Mittelsteadt applies his verification methodology to a conventionally armed military drone that may or may not use AI, but is a proposed solution for the verification of Lethal Autonomous Weapons Systems (LAWS) more generally. He proposes using a third-party inspection model, but these proposals could also be considered under bilateral or multilateral inspection regimes.

A future treaty that prohibited or limited the use of LAWS would struggle to find a model verification protocol from existing arms control treaties, which have struggled to regulate software. Counting missiles or fissile material while observing a state's research and procurement activity is at the core of regimes such as the Non-Proliferation Treaty or treaties such as New START. For instance, the monitoring of use of software in nuclear regimes is not regulated by inclusion

into systems, but in export control regimes and research and development declarations to inspectors.

Confirming if a system is using AI or not seems like an insurmountable verification task. Allowing inspections of military drones chimes with the familiar information barrier problem from nuclear disarmament verification—the very inspection of the system itself is a security risk.

Mittelsteadt proposes a solution that recognises that all technologies with hardware and software components are systems that can be divided into modular subsystems and an operating system. The operating system allocates resources and the subsystems perform specific functions while selectively communicating with each other and the operating system. For instance, in a smartphone there are distinct subsystems such as wifi and Bluetooth, along with the operating system software. A military drone would similarly have several subsystems, including the targeting and firing systems.

Under this protocol the subsystems and operating system would be divided into ‘quarantine zones’ and ‘verification zones’. The verification zones are the only parts accessible for inspections and the quarantine zones are uninspected subsystems. In traditional arms control this mitigates the aforementioned information barrier problem by limiting the scope of the inspections.

Clearly this alone is not sufficient to verify if a targeting and firing system are AI free—it remains possible that an uninspected part could simply be hiding the AI to control firing and targeting. Mittelsteadt’s solution to this is the AI equivalent of a material balance area in nuclear material accounting. In the interface between the verification zone and other subsystems all traffic going in is monitored. If it is determined in these accountancy areas that commands could come from a quarantine zone, then it is not possible to verify that the system is AI-free. Likewise, if no AI commands are seen entering the verification zone it is possible to verify that area as AI-free.

With an AI verification regime, systems could be developed including ‘safeguards by design’. That would involve moving security-sensitive systems to quarantine zones and physically air-gapping the verification zones from other subsystems. Current systems may have highly interconnected subsystems that could be altered to provide clear delineations between verification zones and quarantine zones. Also, there

could be agreed standard functions and component labelling that would support verification inspections.

According to Mittelsteadt, software inspection, even in only a verification zone, carries security risks. The security cost of inspecting code in a verification zone could be increased risk of successful cyberattacks to this system. Mittelsteadt argues that states should weigh this against the possible benefits to verifying LAWS by sacrificing a portion of system security. Yet, the balance between keeping opacity for state security and transparency for inspections is one of the core problems of developing an inspection regime.

Other options presented in the paper may offer a solution. First, hardware-only inspections that identify AI-capable chips could be used. Secondly, like nuclear disarmament verification, there are two methods of verifying what is in front of an inspector. The first method is a direct measurement, such as measuring radiation from fissile material properties in the warhead, which can be likened to directly inspecting software in a verification zone. The second is making a measurement on a model warhead as a template and comparing this template to other warheads. To do a template analysis on a system running software Mittelsteadt proposes using Van Eck Radiation analysis where a verified AI-free operation provides a radiation profile template which can then be compared with subsequent operations.

Verifying that systems keep a human in the loop is a challenging arm control problem and the conversation using concepts such as these should continue.

## VERTIC webinar series

The team have delivered two webinars so far this year as part of our new ‘VERTIC Webinar Series’. The first, [Staying in Nuclear Policy](#), took place on 15 April 2021. The webinar focussed on barriers to retention in the nuclear policy field. The second webinar, [The People of OSINT](#), took place on 11 May 2021. The panel focussed on pathways to entry into open-source intelligence (OSINT) work, as well as how the field has changed over the years. All our webinars are live streamed and available as recordings on our [YouTube channel](#).

## Centre News

### National Implementation Measures

Sonia Drobysz, Yasemin Balci, Thomas Brown and Suzanna Khoshabi

The National Implementation Measures (NIM) team has continued to advance a number of global projects, including one funded by the Norwegian Ministry of Foreign Affairs to provide legislative assistance for national implementation of the Biological Weapons Convention (BWC) and the Chemical Weapons Convention (CWC). NIM has published their newly updated legislation analysis tools, the [BWC](#) and [CWC](#) legislation survey templates. The team has also continued to update their publicly available awareness-raising and drafting material, such as the [BWC](#) and [CWC Fact Sheets](#), and to support partners' development of tools. Associate Legal Officer Thomas Brown spoke on national implementation at the Regional Workshop on Achieving the Universalization of the Biological Weapons Convention in Africa on 4 March. NIM has also engaged with a number of countries to provide legislative analysis and drafting assistance for the BWC and CWC.

As part of EU CBRN CoE Project 8r on **Enhanced Biosecurity in South East Asia**, NIM is providing biosecurity legislative analysis and meeting virtually with state representatives in the region and project partners. The team will also begin analysing partner countries' legislation which was adopted and/or implemented during the pandemic as part of a new work stream added to the project in November 2020 to include the response to the pandemic. Work is also progressing under EU CBRN CoE Project 6I in Southeast Asia to develop comprehensive legal analyses of the partner countries' **legislation for the sound management of chemicals and their wastes**.

NIM has continued to work on a project to promote **universalisation and implementation of the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT)**, implemented by the UN Office of Counter-Terrorism and the UN Office on Drugs and Crime. Senior Legal Officer Yasemin Balci gave a presentation on NIM's academic study of the reasons and challenges for UN Member States not becoming party to ICSANT at a briefing for the UN Permanent Missions on 24 February. She also remotely attended as an observer an advocacy event in relation to the Convention held by Tajikistan on 25 February.

NIM staff participated in several virtual events and networks. Programme Director Sonia Drobysz presented a lecture on 'Nuclear Security' at the **OECD Nuclear Energy Agency's Fundamentals of International Nuclear Law** online educational programme on 17 February and Thomas became a member of the **Emerging Voices Network**, an initiative organised by the British American Security Information Council (BASIS) to connect next-generation leaders on nuclear weapons issues. He also attended the **Global Partnership** First Plenary and CBRN Intersessional meetings, under the UK Presidency, in March.

### Verification and Monitoring

Larry MacFaul, Noel Stott, Grant Christopher, Alberto Muti, Elena Gai and Anuradha Damale

#### Capacity building for nuclear disarmament verification

The team has continued to engage with partners in Kazakhstan, South Africa, Brazil and Argentina on strengthening capacity building for nuclear disarmament verification (NDV). On 12 February 2021, VERTIC and the Radiation and Health Physics Unit at the University of the Witwatersrand hosted an online African regional workshop to continue to discuss the establishment of an African NDV innovation hub. The workshop was followed by a call for papers providing an African perspective on the policy and technical issues in nuclear disarmament verification. The papers will be presented at future events under the project. On 14 April VERTIC and NPSGlobal hosted the third virtual meeting on Multilateral Verification of Nuclear Disarmament for the Latin American region. The meeting saw presentations and technical contributions on the topic by regional experts, as well as by technical experts from outside the region, reporting on recent multilateral efforts. On 6 May, the International Science and Technology Center held an event on disarmament and non-proliferation as part of its outreach activities in increase awareness of the issue amongst students in Kazakhstan.

#### New nuclear disarmament verification methodologies

The team has continued its work modelling North Korea's WMD production capabilities in order to assess priorities for verification. VERTIC and consortium partners, the James

Martin Centre for Nonproliferation Studies (CNS) and the Royal United Services Institute (RUSI), have been exploring database and data visualisation platforms to assist in understanding, exploring and using this type of information.

### Iranian nuclear futures

Between October 2020 and March 2021, VERTIC and the European Leadership Network (ELN) carried out a project on exploring possible medium- to long-term approaches to the Iran nuclear issue. A strand of the project looked at the lessons learned from the implementation of the Joint Comprehensive Plan of Action (JCPOA) and especially its verification provisions, in view of the negotiation of possible future agreements. Another strand of the work focused on Iran's growing energy demand and its stated goals in terms of technological development and applications of nuclear technology, with the goal of identifying less-proliferative options for Iran's nuclear futures. VERTIC and ELN ran a short series of online seminars engaging experts on these topics. ELN and VERTIC have published a [report on the lessons learned from JCPOA implementation](#). A report on possible scenarios for Iran's nuclear future is forthcoming.

### Other activities

VERTIC Assistant Researcher Anuradha Damale contributed to a policy paper on 'Peaceful Uses, Nuclear Safety and Security: Engaging the Next Generation on Isotope Hydrology' for the joint Emerging Voices Network/UNODA plenary. Anuradha was also an invited speaker at the Girls Security UK Symposium in April, and spoke at the Space Court Foundation event 'Competing for Space Superiority' in May.

VM Programme Director/ VERTIC Acting Executive Director Larry MacFaul took part in a UK Government briefing for civil society representatives on the UK Integrated Review in April 2021, and in a Consultation on UK's National Report pursuant to Actions 5, 20, and 21 of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) 2010 Review Conference.

## Compliance Mechanisms and Measures

Angela Woodward and Cristina Rotaru

### North Korea maritime sanctions

The Compliance Mechanisms and Measures (CMM) Programme's work on implementing UN Security Council sanctions on North Korea continued into the second quarter of 2021. The team is involved in training activities with states and other relevant

maritime stakeholders involved in implementing the sanctions. Operating as part of a consortium together with the James Martin Centre for Nonproliferation Studies and King's College London, the CMM team in 2021 delivered three bespoke training webinars to a state's officials on sanctions matters relevant to their ship registry operations. During this time, the consortium also delivered the first French-language translation of its online e-learning course on North Korean maritime sanctions to Comoros.

CMM's project mandate focuses primarily on research of UN Security Council maritime sanctions-related issues, particularly on matters related to their legal implementation, but also includes identifying new trends in sanctions evasion tactics, looking at case studies of enforcement and compiling best practices of effective national implementation.

### Outreach and external relations

In light of the Covid-19 pandemic-induced travel restrictions continuing in much of the world, the CMM programme's work during the first months of 2021 continued to take place online. Assistance, training and similar instructional activities that would otherwise be delivered during in-person conferences and meetings have been rescheduled for delivery online, and participation in network events has similarly moved to online conferencing platforms.

As much of the United Kingdom remained in lockdown in the first months of 2021, **Cristina Rotaru**, based in London, has continued to engage with the sanctions and compliance community through a number of online webinars and events of relevance to the CMM Programme's work.

**Angela Woodward**, based in New Zealand, gave a speech on the Treaty on the Prohibition of Nuclear Weapons at an entry-into-force event in Christchurch, New Zealand on 21 January which was filmed for an ICAN event later that day. On 2 February she gave a talk on [Nuclear Weapons: From Arms Control to Abolition](#) at the New Zealand Institute for International Affairs in Wellington. She participated in council meetings of the [New Zealand Disarmament and Security Centre](#) on 12 February and 14 May. She spoke at an Asia Pacific Leadership Network for Nuclear Non-proliferation and Disarmament ([APLN](#)) Regional Meeting to Address DPRK Challenges on 12 March, and met with New Zealand's Minister for Disarmament and Arms Control as he announced his [policy agenda](#) in Christchurch on 31 March. On 18 May she spoke about nuclear disarmament and verification at the National Centre for Peace and Conflict Studies at the University of Otago in Dunedin. Her article on Reinforcing the NPT at 50:

Regional Arrangements and Nuclear-Weapon-Free-Zones was published in a special issue of the [Korean Journal of Nuclear Non-Proliferation and Energy](#) on the NPT's role in eliminating nuclear weapon threats in Northeast Asia, in association with the APLN, of which she is a member.

## Staff News

The CMM team is made up of Angela Woodward, Programme Director and VERTIC Deputy Executive Director, and Cristina Rotaru, Researcher. In March 2021, Angela passed on the role of VERTIC Acting Executive Director to Larry MacFaul, Programme Director of the Verification and Monitoring (VM) Programme, after serving in that role since November 2019.



building trust through verification

### Mission statement

VERTIC is an independent, not-for-profit, non-governmental organisation. Our mission is to support the development, implementation and effectiveness of international agreements and related regional and national initiatives, with particular attention to issues of monitoring, review, legislation and verification. We conduct research, analysis and provide expert advice and information to governments and other stakeholders. We also provide support for capacity building, training, legislative assistance and cooperation.

### Personnel

Ms Angela Woodward, Acting Executive Director (New Zealand/United Kingdom);  
 Mr Larry MacFaul, Programme Director (United Kingdom);  
 Dr Sonia Drobysz, Programme Director (France);  
 Ms Yasemin Balci, Senior Legal Officer (the Netherlands);  
 Dr Grant Christopher, Senior Researcher (USA);  
 Mr Alberto Muti, Senior Researcher (Italy);  
 Mr Noel Stott, Senior Researcher (South Africa);  
 Ms. Nataliya Izedinova, Finance Director (Russia/United Kingdom);  
 Ms. Cristina Rotaru, Researcher (Romania);  
 Ms Elena Gai, Researcher (Italy);  
 Mr Thomas Brown, Associate Legal Officer (United Kingdom);  
 Ms Suzanna Khoshabi, Associate Legal Officer (United Kingdom); and  
 Ms Anuradha Damale, Research Assistant (United Kingdom).

### Board of Directors

Mr Peter Alvey, Treasurer (United Kingdom);  
 Mr Richard Burge (United Kingdom);  
 Dr Owen Greene, Chair (United Kingdom);  
 Ms Laura Rockwood (United States);  
 Mr Nicholas Sims (United Kingdom);

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## Other Centre News

During the first half of 2021, VERTIC's office reopened periodically in accordance with the UK government guidelines in response to COVID-19, however, the majority of staff continued to work remotely. VERTIC's outreach continued through its digital formats: website, social media and emails. Goldwins Chartered Accountants have conducted the annual audit for the year ending 30th October 2020 and concluded that VERTIC's financial record keeping is outstanding. VERTIC has been awarded a 5-year-grant from the Joseph Rowntree Charitable Trust.

Ms Lisa Tabassi (United States); and  
 Dr John Walker (United Kingdom).

### International Verification Consultants Network

Dr Nomi Bar-Yaacov (United Kingdom);  
 Ambassador Richard Butler (Australia);  
 Mr John Carlson (Australia);  
 Ms. Joy Hyvarinen (United Kingdom);  
 Dr Edward Ifft (United States);  
 Mr Robert Kelley (United States);  
 Dr Patricia Lewis (United Kingdom);  
 Dr Robert J. Matthews (Australia);  
 Professor Colin McInnes (United Kingdom);  
 Professor Graham Pearson (United Kingdom);  
 Dr Arian L. Pregonzer (United States);  
 Dr Rosalind Reeve (United Kingdom);  
 Dr Neil Selby (United Kingdom);  
 Minister Victor S. Slipchenko (Russian Federation); and  
 Professor David Wolfe (United States).

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