

Introduction

The development of the first nuclear bombs by the United States in 1945 and their use on Hiroshima and Nagasaki initiated an arms race and build-up of nuclear arsenals, mainly by the two powers at that time, the United States and the Soviet Union, which competed for increasingly lethal weapons in ever-greater numbers. With the start of the NPT negotiations and the establishment of the IAEA in 1957, the first steps towards controlling the proliferation of nuclear weapons were taken, while facilitating cooperation for the peaceful uses of nuclear energy and the promotion of nuclear disarmament¹. Since the NPT entered into force in 1970 and especially since the end of the Cold War in 1991, steps have been taken towards nuclear disarmament and non-proliferation, with the NPT as the cornerstone of the nuclear disarmament and non-proliferation architecture, as well as a number of other bilateral and multilateral agreements. This has resulted, on the one hand, in keeping the number of States with nuclear weapons low, less than predicted in the 1960s, and, on the other hand, in reducing the number of nuclear weapons.

The worsening of the security situation and the conflicts in recent years, especially since the start of Russia's war against Ukraine in 2022, have led to a crisis in the nuclear non-proliferation and disarmament architecture, reversing the trend towards disarmament and making it difficult, and in some cases impossible, to reach agreements.

With the NPT review conference and the end of the bilateral nuclear arms control agreement between the US and Russia scheduled for 2026, this chapter analyses the different systems that comprise the nuclear non-proliferation and disarmament architecture, the current status of the systems, the new initiatives and threats faced by them, and their possible evolution in the coming years.

Crisis in multilateral nuclear forums

In recent years, the international security situation has become highly fragile and unstable. The return of the war in Europe due to Russia's war against Ukraine, the escalation of the conflict in the Middle East following the attacks of 7th October 2023,

¹ The IAEA was established in 1957 in response to the deep fears and expectations surrounding the discoveries and varied uses of nuclear technology. It was created as the world organisation of "atoms for peace" within the United Nations system. From the outset, its mandate was to work with member States and multiple partners around the world to promote the peaceful, safe and secure use of nuclear technologies. See: <https://www.iaea.org/es/el-oea/historia>

increased threats from North Korea and tensions around Taiwan, and the nuclear rhetoric used as a threat in several of these conflicts have contributed to the deterioration of inter-state relations and the balance in multilateral forums.

This has led to institutional crises and lack of progress in the various treaties and instruments that comprise the nuclear non-proliferation and disarmament architecture, mainly in the area of disarmament, which has affected the NPT and the Conference on Disarmament. Besides, it must be added the non-ratification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), the deadlock in the negotiation of the Fissile Material Cut-Off Treaty (FMCT), the tension added by the ratification of the Treaty on the Prohibition of Nuclear Weapons (TPNW) and the suspension of the US-Russia Strategic Arms Reduction Treaty (START).

Treaty on the Non-Proliferation on Nuclear Weapons

The NPT² is defined as the "cornerstone" of the nuclear non-proliferation and disarmament regime and has made a major contribution to international peace and security. It is a multilateral treaty that was opened for signature in 1968 and entered into force in 1970. After the UN Charter, it is the most universal international legal instrument, currently with 191 States Parties (except India, Israel, North Korea³, Pakistan and South Sudan). Since 1995, the NPT is in force indefinitely and subject to a five-year review cycle of the state of its implementation, culminating in review conferences. States Parties to the NPT meet in preparatory committees during the three years prior to each review conference, at the UN headquarters in Vienna, Geneva and New York, to identify points of divergence and consensus.

The NPT is built around three "pillars": the first relating to nuclear disarmament for States with nuclear weapons⁴ (China, France, Russia, the United Kingdom and the United States); the second, to the non-proliferation of nuclear weapons for non-nuclear-weapon

² See: <https://www.un.org/es/conf/npt/2010/npttext.shtml>

³ North Korea was a State Party to the NPT until January 2003, when it announced its withdrawal. See: <https://www.iaea.org/newscenter/focus/dprk/fact-sheet-on-dprk-nuclear-safeguards>

⁴ Under the terms of the treaty, nuclear-weapon States parties are defined as all States that have manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1st January 1967. See: <https://www.iaea.org/es/temas/el-oiea-y-el-tratado-sobre-la-no-proliferacion>

States; and the third, to the promotion of and right to the peaceful use of nuclear energy for all States.

The last time an agreement was reached at an NPT Review Conference was in 2010, when specific disarmament commitments were agreed upon⁵. At the 2015 review conference, no consensus was reached on the draft *Review Conference Outcome Document*, due to disagreements over holding a conference to create a Middle East WMD-free zone⁶ by 1st March 2016 (Wan, 2015).

The 2022 review conference (corresponding to 2020, but postponed due to the Covid-19 pandemic) ended without agreement due to Russia's opposition to the final document due to including references criticising the attack on the Zaporizhzhia nuclear power plant, within the context of Russia's war against Ukraine (Schneider and Horowitz, 2022).

The first two preparatory committees of the current review cycle, which will end in 2026, have already taken place. The 2023 Preparatory Committee, held in Vienna, concluded without consensus on the final report intended to factually collect the discussions that took place throughout the committee, and the topics that will dominate discussions in the current review cycle became clear: growing frustration at the lack of progress on disarmament, especially by non-aligned States⁷; increased questioning (led by China) of "nuclear sharing" arrangements (establishing nuclear weapons in non-nuclear-weapon States), extended nuclear deterrence (policy of using nuclear weapons to defend non-nuclear allies) and export control regimes⁸, and criticism to China for its lack of transparency, the build-up and modernisation of its arsenals, and its refusal to join the moratorium on fissile material production. Both the factual summary and the Chair's recommendations could be presented at the Second Preparatory Committee held in Geneva in July 2024, which was a slight improvement from the previous year's committee, although there were still disagreements regarding the aforementioned topics.

⁵ See: <https://documents.un.org/doc/undoc/gen/n10/390/24/pdf/n1039024.pdf>

⁶ The 1995 NPT Review Conference adopted a number of decisions including the indefinite extension of the NPT (until then it had to be extended at each review conference) and the call for the establishment of a zone free of nuclear, chemical and biological weapons of mass destruction and their delivery systems. This WMD-free zone in the Middle East would commit States to not possess, acquire, test, manufacture or use any nuclear, chemical and biological weapons and their delivery vehicles (Arms Control Association, 2019).

⁷ The Non-Aligned Movement originated in 1955 and brought together nations that did not wish to engage in the ideological confrontation of the Cold War, but instead focused on struggles for national independence and economic development. See: <https://nam.go.ug/history>

⁸ More information in the chapter "The future of nuclear deterrence: an analysis of the strategies of major nuclear powers" by Frías Sánchez in this notebook.

Despite the crisis suffered by the NPT in recent years, the Treaty has been remarkably successful in terms of non-proliferation and the promotion of peaceful uses of nuclear energy. At a press conference in 1963, US President John F. Kennedy warned that he saw "the possibility in the 1970s of the President of the United States having to face a world in which fifteen, twenty, or twenty-five nations may have these weapons". However, as of 2024, only four States had developed nuclear weapons since the NPT entered into force (India, Israel, North Korea, and Pakistan). North Korea's exit from the NPT in 2003 dealt a severe blow to the Treaty, to which it has been added in recent years the uncertainty over Iran's nuclear programme, which, if not adequately resolved, could trigger another nuclear proliferation crisis. With regard to the peaceful uses of nuclear energy, and through the IAEA and its Technical Cooperation Fund, various projects are being established in the areas of training, safety and security, together with applications in the fields of health, nutrition, agriculture and the environment (International Atomic Energy Agency, n.d.).

In terms of nuclear disarmament, the NPT, which provides in Article VI that nuclear-weapon States shall proceed towards disarmament in good faith, has achieved more modest results. Although there were around 39,000 nuclear weapons in the world when the treaty was opened for signature, and this number has been reduced to 12,000 by 2024 (Kristensen *et al.*, 2024d), this progress has been achieved bilaterally through various strategic disarmament treaties signed between the US and Russia. In the last of these treaties, the 2010 New START, both States committed to decreasing strategic deployed weapons by 30% and to modernise and update the mutual verification system to make it more effective and transparent, requiring faster exchanges of information and notifications. This treaty expires in February 2026 and, in addition, in February 2023 Russia suspended the application of the verification measures provided in the Treaty, although they did not completely withdraw from it, arguing the hostile attitude of the US for providing weaponry and financial assistance to Ukraine.

For its part, China has historically resisted becoming a member of nuclear arms control agreements on the grounds that its arsenals are small compared to those of the US and Russia. Within the NPT, this stance has been criticised as being incompatible with Article VI and increasingly inconsistent with the increase and modernisation of nuclear arsenals in recent years (Seligman, 2022). While China agreed to start a bilateral nuclear

dialogue process with the US in November 2023, it suspended it in July 2024, in reaction to US arms sales to Taiwan.

Therefore, in terms of disarmament, the increase in operational nuclear warheads, the existence of modernisation programmes for both nuclear warheads and their delivery vehicle systems (Stockholm International Peace Research Institute, 2024), and the finalisation of the few existing nuclear arms control treaties only further erode and call into question the relevance of the NPT.

Conference on Disarmament

Another major instrument today is the Conference on Disarmament which, with 65 member States⁹, is the only permanent body for negotiating disarmament issues in which all nuclear weapon States are present¹⁰. Within the Conference of Disarmament, key treaties for non-proliferation and disarmament have been negotiated, like the NPT, the Chemical Weapons Convention, the Biological Weapons Convention and the CTBT, among others. However, it has been in deadlock for the past twenty years, and has failed to adopt a working plan. Reasons include the strict application of the consensus rule, tensions between different "disarmament sensitivities", and the impact of unresolved regional conflicts (such as Russia's war on Ukraine) on its functioning.

Currently, the CD mainly works, among others, on the cessation of the nuclear arms race and nuclear disarmament, the prevention of nuclear war, the prevention of an arms race in outer space, the pursuit of effective international arrangements to safeguard non-nuclear-weapon States against the use or threatened use of nuclear weapons, and on new types of weapons of mass destruction and new systems of such weapons (such as radiological weapons) (United Nations Office for Disarmament Affairs, n.d.a.).

⁹ See: <https://web.archive.org/web/20040626212727/http://disarmament2.un.org/cd/cd-backgrnd.html>

¹⁰ The Conference on Disarmament was founded in 1979 as a forum for the negotiation of multilateral arms control and disarmament agreements and is an "autonomous body" recognised by the United Nations. The Director General of the United Nations Office at Geneva serves as Secretary-General of the Conference on Disarmament, and the Conference is also based at this Office. Through the president, the conference reports annually to the UN General Assembly. See: <https://documents.un.org/doc/undoc/gen/g23/186/41/pdf/g2318641.pdf>

Comprehensive Nuclear-Test-Ban Treaty (CTBT)

Another element contributing to the crisis in the nuclear non-proliferation and disarmament architecture is the failure of the CTBT to enter into force (Graham, 1996). This treaty was adopted in 1996 with the aim of banning both atmospheric and underground nuclear testing (hence the term "comprehensive"), which is seen as a fundamental step towards non-proliferation, both by preventing new States from gaining access to nuclear weapons and by making it more difficult for those that already possess them to apply technological advances to their nuclear arsenal by banning testing. Despite not entering into force, it is an extremely important instrument for the detection, monitoring, control and verification of nuclear weapons detonations through its International Monitoring System (IMS), consisting of 337 facilities (321 monitoring stations, including seismic, radiological and hydroacoustic facilities, and 16 laboratories), of which almost 90% are already operational, covering up to 89 States and with multiple scientific applications (Comprehensive Nuclear-Test-Ban Treaty Organisation, n.d.).

Annex II of the CTBT contains a list of 44 States whose ratification is compulsory for the treaty to enter into force, as all of them have military, civilian or research nuclear reactor programmes and, currently, it is pending the ratification by China, Egypt, India, Iran, Israel, North Korea, Pakistan and the United States. In 2023, Russia joined these countries by withdrawing its ratification of the treaty, although maintaining its signature, thus bringing its status in line with the US (which has also signed but not ratified the CTBT). This move is a clear reversal of the trend in recent years of increasing the number of countries ratifying the CTBT, and a further symptom of the crisis in the nuclear non-proliferation architecture.

The Fissile Material Cut-off Treaty (FMCT)

The FMCT, a treaty banning the production of fissile material for military purposes, is a commitment made by the Conference on Disarmament in 1995 and reiterated by the 2010 NPT Review Conference, but its negotiation has not started. To minimise the effects of this paralysis, there have been growing calls for the declaration of a moratorium on fissile material production as an interim measure until the treaty is signed. There is broad

support for this proposal, but it has not yet been formally adopted because of the resistance from some states, including China, whose opposition is the strongest. For its part, Russia is formally in favour of the treaty and the moratorium, although it has not been particularly active in its defence¹¹.

Treaty on the Prohibition of Nuclear Weapons

In reaction by a group of states to the lack of progress on nuclear disarmament within the NPT framework, the TPNW entered into force in 2021 (Office for Disarmament Affairs, n. d.b), which prohibits developing, producing, receiving, transferring, threatening or using nuclear weapons and includes provisions on the prohibition of nuclear testing, seeking or receiving assistance from any State for any activity contrary to the treaty, as well as the prohibition of stationing, installing or deploying any nuclear weapon on the territory of a State Party. It is currently signed by 94 States¹² and ratified by 73, including none of the nuclear States.

Although the NPT and the TPNW share the goal of achieving the complete elimination of nuclear weapons, the TPNW has some weaknesses, such as the lack of a clearly defined disarmament verification protocol, the non-adherence (so far) of any of the nuclear weapon States, and its incompatibility with a step-by-step approach to disarmament. In addition, the entry into force of the TPNW has the potential to further weaken the current system, as it forces the diversification of efforts, previously focused on strengthening and advancing compliance with the obligations assumed under the NPT as a universally accepted non-proliferation and disarmament instrument.

On the other hand, the TPNW has been able to incorporate the humanitarian approach of the consequences of the use of nuclear weapons, which until now had been largely absent from NPT discussions. This has contributed to gaining ground with many partners in the global south (some directly affected by nuclear tests in past decades, such as Kazakhstan or Tuvalu), as well as with public opinion and civil society.

¹¹ For further information, see the chapter "Russia's nuclear power: new approaches to capabilities and doctrine of use" by Pérez Gil in this notebook.

¹² See: <https://treaties.unoda.org/t/tpnw/participants?status=signatories>

Other factors

Other factors that have contributed to the weakening of the nuclear non-proliferation regime include the consequences of Russia's war against Ukraine, challenges to export control regimes, and new dangers arising from the development of new technologies.

Russia's aggression against Ukraine

Russia's unilateral, illegal and unjustified aggression against Ukraine has permeated all international forums and contributed to further stress the nuclear non-proliferation and disarmament regime.

First, the aggression is a breach of the Budapest Memorandum (Office for Disarmament Affairs, 1994), signed in December 1994 by the US, the United Kingdom, Russia and Ukraine, in which the three nuclear powers undertook to respect Ukraine's sovereignty and territorial integrity in exchange for the nuclear arsenal on its territory being returned to Russia, and Ukraine's accession to the NPT as a non-possessor state. Russia's breach of the agreement, initially in 2014 with the invasion of the Crimean Peninsula, has led to loss of confidence in the compliance of negative security assurances and reassessment of the potential utility of nuclear weapons possession for deterrent purposes (Budjeryn, 2014).

Additionally, the aggression has led to a continuous exchange of accusations in all multilateral forums between Russia and its allies (essentially Belarus) on the one hand, and the states opposing the aggression (mainly the US and European States) on the other. The first consequence has been the paralysis of processes and the difficulty of reaching consensus in such forums; among which the lack of agreement at the 2022 NPT review conference is perhaps the most serious. The second consequence has been the growing frustration of global partners attending these meetings, witnessing how the discussions focus on the conflict in Ukraine while the substantive issues of these forums, and their own interests, are relegated to a second place (Notte, 2024). This has contributed to increasing the disaffection that already existed in these States with regard to the NPT due to the perceived imbalance in the implementation of the pillars of disarmament and peaceful uses, the insufficient recognition of the humanitarian claims of the States that suffered the consequences of the nuclear tests, and the prioritisation of

the interests of the nuclear States recognised in the Treaty (Herrera, Kulkarni and Garrido Rebolledo, 2023): 1-15).

Challenges to export control regimes

With regard to export control regimes, there is a growing trend among global partners, led by China, to question export controls, both within the NPT and in the framework of the UN General Assembly, where they submit a draft resolution every two years entitled "Promoting International Cooperation on Peaceful Uses in the Context of International Security". This narrative argues that export controls are discriminatory, non-transparent and used politically to impede the development of States in the global south by controlling access to certain technologies. As an alternative, China suggests the establishment of an export control system within the UN framework, but given the current lack of agreement in multilateral forums, it is unlikely that a new control regime could be successfully negotiated. These criticisms of the current export control regimes overlook the fact that these regimes have so far been an effective tool in the fight against non-proliferation, creating a level playing field at the international level, with a set of transparent lists of controlled items. All of this has facilitated export controls, which would otherwise be carried out according to criteria chosen independently by each State, making exports very difficult.

In the nuclear field, the Nuclear Suppliers Group (NSG)¹³, currently comprising 48 members, defines and implements common and agreed guidelines to control exports of nuclear and dual-use materials, equipment and technology (for use in both nuclear and non-nuclear technology applications) and ensures that civil nuclear trade is not diverted to nuclear weapons development or production programmes, or to use by non-state actors.

New technologies

In addition, there is an ever-increasing and faster technological development that entails new threats. On the one hand, AI facilitates the autonomy of nuclear detection systems, mainly in its communications, command and control segment, to the point of allowing the

¹³ See: <https://www.nuclearsuppliersgroup.org/index.php/es/>.

non-inclusion of the human factor, with the possible ethical risks and associated system failures (Cartagena Núñez, 2022). It would therefore be essential to address the integration of AI into nuclear command and control systems by establishing robust regulatory frameworks, maintaining human control in critical decisions and fostering global cooperation to ensure lasting strategic stability (Herrera, 2025). On the other hand, the development of hypersonic systems, which reduce response times, increases the risk of misinterpretation and consequently, escalation. The growing interrelation between the areas of nuclear defence and space also brings with it new threats. Additionally, these new areas are not yet regulated, which contributes to increased mistrust, risk of escalation, misinterpretation and stress on the elements of the nuclear non-proliferation architecture, and opens the possibility of creating new crises.

Variable geometry

On a more positive note, and in order to complement and revitalise the more formal and institutional forums and treaties, new initiatives have emerged that question the traditional balance of power and opt for a variable geometry, while maintaining the institutions of today. Some of those created in the nuclear field, being Spain part of some of them, are the Non-Proliferation and Disarmament Initiative (NPDI), International Partnership for Nuclear Disarmament Verification (IPNDV), Creating an Environment for Nuclear Disarmament (CEND) or the Stockholm Initiative for Nuclear Disarmament (SI). All of these initiatives make possible to continue the dialogue at a time when talks between States within the framework of institutional regimes are becoming increasingly complicated.

Non-Proliferation and Disarmament Initiative

The NPDI¹⁴ was founded in 2010 by a group of States¹⁵ that, at the ministerial level and within the framework of the NPT, sought practical steps to boost consensus outcomes at the 2010 NPT Review Conference, in order to advance the nuclear disarmament agenda and seek greater transparency in the way nuclear-weapon States implement their

¹⁴ See: <https://www.nti.org/education-center/treaties-and-regimes/non-proliferation-and-disarmament-initiative-npdi/>

¹⁵ Australia, Canada, Chile, Germany, Japan, Mexico, the Netherlands, Poland, Turkey.

disarmament commitments. Following the first ministerial meeting in September 2010, it continues to meet twice a year.

The NPDI has no formal constitution or permanent secretariat and its administration is not hierarchical. Decisions are taken by consensus, but not unanimously. Current NPDI priorities include promoting greater transparency around nuclear disarmament efforts, addressing the lack of substantive work in the Conference on Disarmament, enhancing support for and formalising key legal instruments safeguarding and regulating nuclear activities, and strengthening the NPT regime.

International Partnership for Nuclear Disarmament Verification

The IPNDV¹⁶, created in 2014, is an initiative that brings together over 25 nuclear and non-nuclear States to work on identifying and developing practical solutions to the challenges associated with nuclear disarmament verification. To this end, States collaborate with national institutions, government agencies, military services and universities to identify possible procedures and technologies that may be used in future nuclear disarmament agreements and to test their application in scenario-based exercises and technical demonstrations.

The IPNDV is working to address two key verification challenges. On the one hand, given that there are no internationally agreed procedures for verifying the dismantling of nuclear weapons, it seeks to develop an inspection and monitoring procedure for this purpose. On the other hand, to ensure that States have the technical capacity to support the multilateral verification process of nuclear disarmament, it seeks to build international technical capacity and expertise by bringing together experts from nuclear-weapon and non-nuclear-weapon States to exchange mutually beneficial knowledge. Partners meet in person several times a year to exchange information and conduct technology exercises and demonstrations.

¹⁶ See: <https://www.ipndv.org/>.

Creating an environment for nuclear disarmament

The CEND (US Department of State, n.d.b) was launched by the US during the 2019 Third Preparatory Committee for the NPT Review Conference in order to establish a forum for dialogue to make progress in identifying and addressing security factors that hinder progress on disarmament, re-establishing more favourable conditions for global security and peace, reducing the potential for armed conflict, building trust and transparency among nuclear States, and establishing a pragmatic approach to disarmament. The goal was to have a debate on disarmament in a more relaxed and less formal atmosphere, allowing participants to freely express their technical opinion, which may not necessarily be in line with the official position of the States they represent.

Stockholm Initiative for Nuclear Disarmament

The SI was born with the aim of strengthening the NPT regime, energising nuclear disarmament and contributing to the success of the 2020 Review Conference (Government of Sweden, 2024). It is co-led by Sweden and Germany, and initially comprised of 16 States, from different regions and with different positions on how to advance towards disarmament. The initiative began with meetings of foreign ministers in Stockholm in 2019 and Berlin in 2020, where a political declaration and 22 concrete and realistic steps, called *Stepping Stones*, were agreed as a proposal to advance the NPT's goals. These measures cover issues such as encouraging further reductions in nuclear arsenals, moving towards the entry into force of the CTBT, promoting the negotiation of an agreement banning the production of fissile material for military purposes (FMCT), the establishment of a nuclear-weapon-free zone (NWFZ) in the Middle East and greater involvement of youth in nuclear disarmament, among many other issues. Later, at the 2022 Review Conference, the working papers "*Stepping stones for advancing nuclear disarmament*"¹⁷ and "*A nuclear risk reduction package*"¹⁸ were presented.

Within the context of the current NPT review cycle, the SI has continued to work on proposals that contribute to nuclear disarmament by submitting the paper "*Stepping up efforts: towards a successful review cycle*"¹⁹, which updates the 2020 *Stepping Stones*

¹⁷ See: <https://documents.un.org/doc/undoc/gen/n21/348/45/pdf/n2134845.pdf>

¹⁸ See: <https://documents.un.org/doc/undoc/gen/n22/461/45/pdf/n2246145.pdf>

¹⁹ See: <https://documents.un.org/doc/undoc/gen/n24/149/52/pdf/n2414952.pdf>

paper and incorporates certain elements of the 2023 document on reflections by the Chair, mainly related to increased transparency and accountability.

Threat of nuclear use

While the taboo on nuclear use remains in place and no tests have been conducted after North Korea in 2017, another worrying trend that has been very present in all multilateral forum meetings is the growing threat of nuclear use, which has been raised in recent years by Russia (in the context of the war in Ukraine), by Israel (in the context of the conflict in the Middle East following the 7th October 2023 attacks), and by North Korea. In addition, changes in North Korea's and Russia's nuclear doctrines in 2024 increase tension and strategic instability.

Pact for the future

This concern was reflected in the *Pact for the Future*²⁰, signed at the United Nations in September 2024, where world leaders agreed on several measures to work together in the areas of peace, security, sustainable development, climate change, digital cooperation, human rights, gender, youth and the transformation of global governance. Regarding nuclear disarmament, UN member States expressed their "deep concern" about the state of nuclear disarmament and reaffirmed their support for the common goal of a nuclear-weapon-free world and for the fulfilment of nuclear disarmament obligations and commitments set out in the NPT and other instruments. They also agreed on the need to "take all measures to prevent nuclear war".

The UN Secretary-General Antonio Guterres (2024) stressed that the pact represents the "first agreed multilateral support for nuclear disarmament in over a decade". Action 25 sets out the commitment to advance the goal of a nuclear-weapon-free world through, *inter alia*, honouring and respecting security assurances undertaken, strengthening the disarmament and non-proliferation architecture and the full and effective implementation of respective nuclear disarmament and non-proliferation obligations and commitments.

²⁰ See: <https://documents.un.org/doc/undoc/gen/n24/272/25/pdf/n2427225.pdf>

The future of the non-proliferation regime

Based on the instability in the international non-proliferation and nuclear disarmament architecture, it is necessary to envisage the possible evolution scenarios of the entire institutional framework. This exercise is not only of theoretical interest; rather it is necessary to understand the security environment at which this work is aimed. As seen at the beginning of this chapter, despite all its vicissitudes, the nuclear regime built around the centrality of the NPT has been an unquestionable success: the number of countries with nuclear weapons is considerably lower than was envisaged almost 65 years ago. This demonstrates that there is a link between a sound institutional architecture and the achievement of specific security objectives, such as preventing the proliferation of nuclear weapons.

What has fortunately not been tested since the NPT entered into force in 1970 is the evolution of nuclear arsenals in the absence of institutional instruments to prevent their proliferation. All this at a time of great international instability, combined with the increasing diffusion of nuclear technologies, which are no longer an arcane reserved only for the most advanced States. It may be assumed, however, that a situation that could be described as nuclear anomie would have a highly negative impact on international peace and security.

Return from the abyss

An initial scenario to consider would be the so-called return from the abyss. It is an optimistic scenario in which a situation of imminent nuclear crisis triggers a reaction to reinvigorate the international non-proliferation architecture. While it seems unlikely that this will be the case, it is not entirely out of the question.

On the one hand, there is historical precedent that certain moments of nuclear tension have served to boost the fight against the proliferation of nuclear weapons. The negotiations that culminated in the signing of the NPT itself began in 1965, shortly after China's nuclear test on 16th October 1964 (Garrido Rebolledo, 2009b). This test, known as CHIC-1 or Project 596, was a setback for the US intelligence community, which had estimated that China was still far from developing a nuclear bomb (Burr, 2014). This setback, which also seemed to confirm President Kennedy's earlier predictions, led the

US and the other nuclear powers to become convinced of the need to negotiate a treaty to prevent the proliferation of nuclear weapons, a concept that was beginning to take shape at the time.

Even before the NPT, the Cuban missile crisis of 1962 led to the negotiation and signing of the 1967 Treaty of Tlatelolco as a reaction (Román-Morey, 2022: 51-77). This Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean created the NWFZ in Latin America and the Caribbean, a model for other regions, which are fundamental elements of the nuclear non-proliferation architecture. The treaty also created the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL), an organisation whose mandate is to ensure the implementation of this treaty to which all regional states are party, following its ratification by Cuba in 2002. Again, one sees how a moment of crisis encouraged the implementation of novel diplomatic mechanisms.

Beyond historical examples, the experience of the X NPT Review Conference, where, despite previous pessimism, a consensus was almost reached (Mukhatzhanova, 2022), demonstrates that institutional crises can also push States into efforts and commitments that they would not accept in times of lower risk. In the run-up to the review conference, held in New York from 1st to 26th August 2022 (United Nations, 2022), the possibility of finding enough points of convergence for a consensus document seemed remote. Consultations led by the conference chair, the Argentinean diplomat Gustavo Zlauvinen, showed wide differences between positions, with a growing gap between pro-TPNW countries and those advocating for a more progressive approach to nuclear disarmament. Successive delays in convening the conference - which should have taken place in May 2020 - due to Covid-19 restrictions allowed for a more structured consultation process. However, this did not lead to reconcile positions, but rather to typecast them. In addition to this negative trend, the full invasion of Russia against Ukraine on 24th February 2022 had a highly negative impact on the entire nuclear non-proliferation and disarmament architecture. Within this context, there was a notable pessimism at the start of the review conference.

However, one of the most highlighted topic throughout the review cycle and in the various national interventions was the need to avoid a second consecutive failure following that of the IX Review Conference in 2015, which would take the nuclear institutional

architecture down an uncharted path. Amidst calls for accountability and under the skilful guidance of the conference chair, a draft outcome document was produced in the final days, making significant progress on key issues such as risk reduction or legal instruments for verification. Only Russian intransigence at the last moment prevented the adoption of this document (Hernández and Kimball, 2022). Once again, finding themselves on the edge of the cliff, most States, in an exercise of responsibility, demonstrated a capacity for commitment to strengthen the regulatory framework, which would not have been expected a few weeks before. Although the draft outcome document was not adopted by consensus due to the express opposition of the Russian delegation, the constructive attitude of the other delegations permits some optimism. This situation of being on the brink of the abyss may be repeated, as highlighted above, in the first half of 2026, culminating in the review conference expected to take place in April or May of that year.

The abyss of a third failure of the NPT review cycle could lead to it being questioned from different sides. On the one hand, proponents of the TPNW may be tempted to view the NPT as an obsolete instrument that has ceased to build consensus and is incapable of making progress towards the elimination of nuclear weapons, leaving the TPNW as the only path to such elimination. On the other hand, within a context of competition between major powers and an incipient nuclear race, nuclear-weapon States' lack of commitment to their disarmament obligations, and the progressive international normalisation of non-signatory States may prompt certain States that already have latent nuclear capabilities to activate Article X of the NPT and withdraw from it. Either of these two options implies serious risks for international peace and security, therefore it cannot be ruled out that States, on finding themselves on the brink of this abyss, may repeat the exercise of responsibility of the 2022 Review Conference and reach a consensus that would enable substantial progress on disarmament and nuclear non-proliferation, and the survival of the NPT itself.

A series of steps may lead to this scenario and represent a reversal of the negative trend of recent years. The first one would be a return to nuclear diplomacy with Iran. The JCPOA (United Nations Security Council, 2015) and Security Council Resolution 2231 of 2015²¹ provides that the termination day (17th October 2025) will be reached ten years

²¹ See: <https://documents.un.org/doc/undoc/gen/n15/225/31/pdf/n1522531.pdf>

after the adoption day (17th October 2015), when JCPOA will no longer be in force and the Security Council will no longer consider the Iranian nuclear dossier. The parameters of an eventual agreement with Iran to extend or replace the current agreement should therefore be defined before that date. Although diplomatic negotiations have been on hold for several months, the lack of alternatives to a deal with Iran may serve as an incentive to negotiate a solution to this dossier that would allow the IAEA to obtain sufficient assurances of the exclusively peaceful nature of Iran's nuclear programme. Technical developments in Iran's nuclear programme make it difficult to replicate the conceptual basis of the JCPOA, which focuses on a combination of quantitative limitations on the production and storage of enriched uranium stocks, as well as on research and development activities, coupled with a strengthened transparency and verification regime. Nevertheless, the technical challenge is not insurmountable in the face of improvements in verification methods developed by the IAEA since 2015. A nuclear deal with Iran would strengthen the international non-proliferation regime both politically, by showing once again the potential to resolve proliferation crises through diplomatic means, and technically, since, as with the JCPOA, novel verification tools must be developed that may serve as an example for the verification and safeguards system at the global level²².

Secondly, the New START treaty (US State Department, 2023) will expire on 5th February 2026. Although it is at a critical stage in the face of Russia's non-compliance and the announced suspension of its implementation on 21st February 2023, it remains one of the basic instruments of the international nuclear arms control regime. The prospects for its renewal do not seem too optimistic, but it should be recalled that its extension, agreed in February 2021, also seemed a long way off. The change in the US presidency allowed the US and Russia to agree on its extension until 2026 on 25th January 2021, entering into force on 3rd February 2021, just two days before it was due to expire (Garamone, 2021). At the moment it is Russia that has sent clear signals about its lack of interest in the renewal of New START, including the removal of any reference to its arms control commitment in its recently published nuclear doctrine (Russian Ministry of Foreign Affairs, 2024).

²² For more information on the Iranian nuclear dossier, see Peña Ruizen's chapter "Iranian-Israeli antagonism within a nuclear context" in this notebook.

Thirdly, if the NPT review conference in 2026 succeeds in reaching a consensus with concrete steps forward in all three pillars and, above all, on disarmament, it would revitalise the non-proliferation and disarmament architecture and strengthen the non-use of nuclear weapons, which has been in place since 1945.

The Stockholm Initiative's *Stepping Stones for Advancing Nuclear Disarmament* (2021) includes many of the concrete measures that have the potential to build consensus:

- 1 Risk reduction. Risk reduction measures are viewed with apprehension by advocates of accelerated disarmament as legitimising the possession of nuclear weapons. But there is no doubt that, until the goal of a world without nuclear weapons is achieved, nuclear risk reduction must be a priority, especially for nuclear-weapon States. It is key that the P5 process, in which the five nuclear-weapon States exchange information on their respective nuclear doctrines and policies, is maintained.
- 2 Transparency and accountability. Closely related to risk reduction, there is a growing consensus on the need for greater transparency by all States, but especially by those with nuclear weapons. Given the frustration with the lack of progress on disarmament, as well as the failure to resolve open proliferation crises, setting transparency mechanisms, such as standardised periodic reporting systems or peer reviews to analyse the degree of compliance with commitments, can reinforce the NPT review cycle.
- 3 Progress towards universalisation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). As discussed above, the CTBT, together with its International Monitoring System, is a key element of the international nuclear disarmament architecture. However, it suffers from the legal weakness of not having entered into force. If, as part of the process of resolving some of the open proliferation crises, any of the Annex II States were to ratify the Treaty, this would be a major step towards its entry into force and, above all, towards the consolidation of the international moratorium on nuclear testing.
- 4 Reactivation of FMCT negotiations. The deadlocked negotiations regarding this Treaty constitute a further symptom of the crisis in the international non-proliferation and disarmament system, and especially in the Conference on Disarmament. While the formalisation of a Treaty banning the production of fissile

material for use in nuclear devices is a long-term goal due to its technical complexity, the mere resumption of negotiations would create a much more favourable climate for redressing the systemic crisis and building confidence among the various parties.

Deepening crisis

However, if the international context causes that the more positive scenario does not materialise, we could move towards a succession of crises leading to the collapse of the existing institutional system. The likelihood that each crisis that will be discussed below may occur is very high. If all of them occur, the likelihood of a general systemic crisis would be very high. If, on the contrary, any of them is avoided, the chances of avoiding a general crisis and therefore of moving towards a more positive scenario that allows some instruments of the system to survive, will increase.

Another element that increases the risk of systemic crisis stems from the fact that there is a nuclear dimension in three of the areas of conflict or tension. First, Russia's nuclear rhetoric within the context of its war against Ukraine, which is aimed at deterring Western support for Ukraine, has the secondary and intended effect of eroding international nuclear non-proliferation norms. In the Middle East, the confluence of several interlinked conflicts overlaps with the existence of a nuclear-weapon State outside the NPT, such as Israel, and the lack of resolution of the Iranian nuclear dossier. In this case, the nuclear dimension adds to and feeds back into regional conflicts. In the Indo-Pacific region, the absence of an open conflict cannot hide tensions, again intensified by a nuclear dimension: from China's nuclear rearmament programme to the periodic tensions between India and Pakistan, not to mention the doubts raised by the new Trump administration regarding its commitment to extended deterrence vis-à-vis its allies in the region.

These potential crises may include:

- North Korea returns to nuclear testing. To date, North Korea has conducted six nuclear tests, the latest on 3rd September 2017. Since then, the North Korean regime declared a voluntary moratorium on nuclear testing in the run-up to the Singapore summit with the US in June 2018, which it subsequently withdrew on 31st December 2019. This fact, coupled with the increasing sophistication of North

Korea's military nuclear programme, makes it likely that nuclear testing will resume at some point (Gramer, 2022).

- Other countries return to nuclear testing. Following Russia's withdrawal of the CTBT ratification in November 2023, further nuclear testing would have a very negative impact not only on the treaty's entry into force, but even on the very survival of nuclear test moratoria. Statements made by the Russian Deputy Foreign Minister Sergey Riabkov in November 2024 that Russia would consider nuclear testing, especially if the US would conduct one, demonstrate that this is not a remote possibility. In this regard, the US, despite not having ratified the CTBT, has maintained a policy of support for it. However, it should be noted that during the previous Trump administration, as well as in the months leading up to the 2024 presidential election, there have been statements from Trump's entourage in favour of resuming nuclear testing (Kimball, 2024). If the US and Russia resume their nuclear tests, it is not out of the question that other countries, especially China, will follow suit. In such a situation, and in an extreme case, the credibility of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO) would suffer greatly, over and above the usefulness of its IMS in detecting various nuclear tests.
- The suspension of nuclear diplomacy with Iran. The JCPOA envisages a very specific timetable in which 17th October 2025 will mark its “termination day”, when most of the restrictive measures provided for in the plan will cease to apply, as well as the institutional mechanisms created by the agreement itself, such as the snapback mechanism which would allow the Security Council to re-impose sanctions on Iran provided for in the resolutions suspended by Resolution 2231 of 2015, without the possibility of a veto by Russia or China. It is hardly foreseeable that, in the absence of significant progress in resolving this issue, the E3 countries will not reactivate the snapback mechanism, which could lead to an intensification of the proliferation crisis and Iran's eventual withdrawal from the NPT. If, moreover, Iran moves towards a militarisation of its nuclear programme, it could decide to withdraw from the NPT (Brewer, 2020), leading to a possible domino effect and regional instability.

- Non-extension of New START and the decision not to respect the quantitative limits provided for in it, with an increased risk of a nuclear arms race (Pérez Gil, 2019).
- Failure of the NPT review conference in 2026, which would lead to a questioning of its usefulness in responding to current challenges.

The consequences of this situation, with a concatenation of crises (Pérez Gil, 2024a) and a collapse of the institutional architecture, could lead a significant number of States with the necessary technical capabilities to take the step of incorporating nuclear weapons into their security doctrines. A scenario of nuclear multipolarity, within a context of international strategic tension and instability, would increase the risk of nuclear use to much higher levels than in the Cold War, where the duopoly in practice of the US and the Soviet Union allowed for strategic stability. And all of this without the guardrails of a solid institutional architecture.

Managing the crisis

The very high risks posed by the worst-case scenario (deepening crisis) to maintaining international peace and security create incentives to avoid falling into it. Therefore, the most likely scenario is one in which the international nuclear non-proliferation and disarmament architecture does not break the deadlock in which it finds itself, but a minimum institutional framework remains in place to manage the crisis.

Within this scenario, at the multilateral level, the NPT would remain the centrepiece of the architecture. Regardless of whether the 2026 Review Conference reaches a consensus document or not, the review cycles will continue to provide a forum for States Parties to engage in dialogue on nuclear issues, which would enhance transparency. The IAEA would also continue to fulfil its verification mandate under the NPT by implementing safeguards agreements and the Additional Protocol, thereby helping to detect and prevent undeclared military nuclear programmes. Even with an NPT in crisis, the IAEA has demonstrated its ability to prevent nuclear proliferation. Although the CTBT has not yet entered into force, its Preparatory Commission and the International Monitoring System will be essential instruments for maintaining the moratorium on nuclear testing. Both in the case of the IAEA and the CTBT, their advanced verification capabilities make it virtually impossible for a country to develop a nuclear weapon without detection. It must

therefore be a priority to not only maintain support for both organisations, but also to strengthen them so they may continue to fulfil their mission, especially when other elements of the architecture are in crisis.

From the perspective of nuclear-armed States, regardless of the degree of existing institutionalisation, the key is to keep channels of communication open. The non-extension of New START, while serious, can be compensated with the continuation of the US-Russia strategic dialogue and even with an understanding whereby both sides apply voluntary limits to their nuclear arsenals. Maintaining the P5 dialogue, albeit at a technical level, will continue to have value as a forum for creating some level of transparency.

Ultimately, the most likely scenario leads to a much more fragile system, with a greatly weakened institutional structure and based largely on voluntary measures, even if this is sufficient to maintain a certain stability and, above all, preserve the taboo on nuclear use.

Conclusions

Since its establishment, the current international disarmament and non-proliferation architecture has achieved great success in limiting the number of States that currently have nuclear weapons in their arsenals. However, in recent years and mainly due to the growing security crises, this architecture is being strained and questions are beginning to arise regarding its survival.

Given this uncertain future, and regardless of the different scenarios analysed, there is a clear trend towards a progressive weakening of the international architecture of arms control, non-proliferation and nuclear disarmament.

This situation should lead, in the first instance, to making every effort to maintain the current regime, always through realistic and progressive proposals that take into account the current security context. The lack of transparency, rearmament programmes and modernisation of nuclear arsenals by some of the P5 countries, especially Russia and China, attack the basis of the agreements reached in the NPT. But the answer must be to continue to focus on gradual processes, as the search for shortcuts, however laudable the intentions of their advocates, may contribute to eroding the system.

However, the international security situation does not permit completely ruling out a collapse of the system. In this case, it will be necessary to devise ad hoc measures, such as those outlined above, to maintain a minimum of stability to prevent the use of nuclear weapons, in the absence of an institutional structure.

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