No cover image available

The Oxford Handbook of Nuclear Security

Christopher Hobbs (ed.) et al.

https://doi.org/10.1093/oxfordhb/9780192847935.001.0001

Published: 2023 **Online ISBN:** 9780191943300 **Print ISBN:** 9780192847935

CHAPTER

The Evolution of Global Nuclear Security Governance

Wyn Q. Bowen, Matthew Cottee, Sarah Tzinieris

https://doi.org/10.1093/oxfordhb/9780192847935.013.11 Pages C11S1–C11N71

Published: 20 June 2023

Abstract

The architecture of global nuclear security governance comprises a complex set of treaties, international agreements, policy instruments, and guidance documents—some of which are formal and legally binding, and others that are informal and dependent on state-level commitment for their application. These instruments are broadly designed to prevent, deter, and respond to non-state actor acquisition of nuclear material for malign purposes. The chapter provides an overview of the evolution of global nuclear security governance. Employing a chronological approach, the chapter charts the formulation of international instruments on nuclear security and seeks to shed light on the international negotiations and policy debates that preceded important developments in the governance architecture. As will become clear, the evolution of global nuclear security governance has often been driven by policy responses to perceived threats or gaps in existing structures.

Keywords: nuclear governance, nuclear security architecture, norms, norm entrepreneur, Atoms for Peace, Lumb Panel, Screwdriver Report, Nuclear Security Summit, IAEA, nuclear security regime

Subject: International Relations, Politics

Series: Oxford Handbooks

Collection: Oxford Handbooks Online

Introduction

The architecture of global nuclear security governance comprises a complex set of treaties, international agreements, policy instruments, and guidance documents—some of which are formal and legally binding, and others that are informal and dependent on state-level commitment for their application. These instruments are broadly designed to prevent, deter, and respond to non-state actor acquisition of nuclear material for malign purposes. This chapter provides an overview of the evolution of global nuclear security governance. Employing a chronological approach, the chapter charts the formulation of international instruments on nuclear security and seeks to shed light on the international negotiations and policy debates that preceded important developments in the governance architecture. As will become clear, the evolution of global nuclear security governance has often been driven by policy responses to perceived threats or gaps in existing structures.

While the importance of nuclear security has been recognized since the discovery of atomic energy, the concept only became embedded in international governance structures from the 1970s. Today, nuclear security is accepted around the world as a fundamental requisite for the peaceful uses of nuclear energy. Over the years this understanding became legally anchored in various binding treaties and resolutions, most prominently those of the United Nations Security Council (UNSC) and the International Atomic Energy Agency (IAEA). Such efforts have created a distinct set of governance structures for nuclear security, although there remains resistance from many states to more permanent or extensive instruments.

Governance structures for nuclear security extend wider, however. Governance refers to 'the process of collective decision-making and policy implementation' and reflects 'norms and processes relating to the delivery of public goods'.[1] The concept of norms explains how heightened awareness among states encourages them to abide by certain standards; while some obligations on nuclear security are enshrined in international law, many others are discretionary and reflect a sense of shared responsibility, or 'oughtness'.[2] This chapter argues that the United States (US) has played a key role as a 'norm entrepreneur' in persuading states to join initiatives and pursue universalization.

Dawn of the Atomic Age, 1940s–1960s

Screwdriver Report

The genesis of the need to secure nuclear and radiological materials came with the dawn of the atomic age, even if the concept of nuclear security itself was formalized much later. Early work on nuclear fission research was driven by the Manhattan Project, which produced the first nuclear weapons, used in 1945 at the end of the Second World War. The recognition that nuclear fission could also be exploited as a cheap and potentially infinite energy source led to the rapid development of a civilian nuclear industry in the post-war period. It was clear from the outset that, whatever their application, the mishandling of fissile materials would pose major risks to human health and the environment—and stringent protections were necessary.

Even in these early years, the potential for what was later termed 'nuclear terrorism' was demonstrated during a closed Congressional hearing in 1946, when Manhattan Project architect Robert Oppenheimer warned about a scenario of hostile operatives smuggling a bomb into New York City. Detecting such a device, he advised, would require a 'screwdriver' to open every crate entering the city, thereby signalling that such a scenario was likely impossible to prevent. At the time, Oppenheimer's testimony appeared alarmist, but it was a catalyst of early thinking about an unconventional nuclear attack, set against the backdrop of the emerging Cold War. The US Atomic Energy Commission (AEC) subsequently commissioned a secret project

on how to detect a clandestine nuclear device.[3] Informally called the 'Screwdriver Report', it marked a shift in perceptions about the threat posed by nuclear materials.

Rapid Growth of Civilian Nuclear Power

President Dwight D. Eisenhower's 1953 'Atoms for Peace' initiative sought to improve the image of atomic science as a non-military technology. It also drove global growth in the industry by facilitating the export of US nuclear technology, materials, and expertise. However, an unintended consequence was the industry's unrestrained expansion. Various incidents indicated that national regulators were ill-equipped to protect nuclear materials. A fire at Britain's Windscale plutonium plant in 1957 released radioactivity across northern Europe, underscoring the vital need to improve nuclear safety standards.[4]

In addition to safety concerns, there was growing unease among Western governments about the adequacy of nuclear safeguards, and in 1957 the IAEA was born. However, in 1965, the AEC discovered that 100 kilograms (kg) of highly enriched uranium (HEU) had been unaccounted for at a Pennsylvania fuel processing and fabrication plant 'over a period of years'.[5] The weakness of early American safeguards and the Windscale fire were a trigger for the development of additional domestic protection measures in the US and the UK. Nevertheless, the emphasis during this period was on nuclear safety standards and nuclear material accounting and control (NMAC), rather than nuclear security.

Growing concerns about security led the AEC to commission an independent review. The panel, led by Ralph Lumb, concluded in its 1967 report that measures should 'be designed in recognition of the problem of terrorist or criminal groups clandestinely acquiring nuclear weapons or materials useful therein'.[6] This was the first formal acknowledgement by any authority that nuclear terrorism posed a threat, and the first time security measures were formally advised. The Lumb panel recommended '[t]he AEC, in cooperation with its licensees, should develop minimum physical protection standards'.[7]

Recognition of the Threat, 1970s–1980s

Emergence of International Terrorism

By the 1970s, the need to safeguard civilian nuclear facilities from the potential diversion of nuclear materials to military use was well established, although the actual threat posed by non-state actors was less understood.[8] But as the decade progressed there was a significant expansion in international terrorist activity. Not only were international terrorist attacks increasing in frequency, but also they were becoming more indiscriminate and audacious—epitomized by the 1972 Munich Olympics hostage massacre. The immediate impact of Munich was the implementation of counter-terrorism measures in several Western countries. The next logical step for terrorists, it was feared by some, might be to attempt to acquire nuclear materials. Scholars such as Thomas Schelling questioned whether 'future terrorists, or motives either personal or political, will hold cities hostage, rather than just airplanes full of people? It has to mean that they could'.[9]

Concerns about unrestrained nuclear proliferation in the 1960s resulted in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) which entered into force in 1970. Supported by both superpowers and regarded as the cornerstone of the international community's non-proliferation architecture, the NPT required state parties to control civil nuclear materials under a safeguards regime verified by the IAEA. It was within this context that a period of policy entrepreneurship on nuclear security ensued.

By now nuclear security was not only the preoccupation of a small number of countries with their own indigenous nuclear facilities. Aided by Eisenhower's Atoms for Peace initiative, civil nuclear energy and research programmes had sprung up globally and many scientific documents on nuclear applications had been declassified. While these developments removed the exclusivity that had characterized the early atomic age, the accessibility of sensitive technology and information gave rise to proliferation risks. The movement of nuclear personnel between countries further disseminated knowledge and skills around the world.[10] No longer was an advanced level of indigenous knowledge a prerequisite for building a nuclear programme.[11]

During the following decade, further atrocities—including bombings by Irish republican paramilitaries, a spate of aeroplane hijackings, and the 1988 bombing of a PanAm plane over Lockerbie—brought into sharp focus the lengths that terrorists were prepared to go to maximize publicity.[12] The upsurge in international terrorism fuelled concerns about weak regulatory practices accompanying the rapid global growth of the civil nuclear sector. There was growing evidence of poor guarding of fissile material, even in established nuclear sectors like the UK, where inadequate arrangements around nuclear waste had been exposed.[13] While terrorism was becoming a growing problem internationally, the threat of terrorist groups targeting nuclear materials was still rather abstract. Several incidents, however, suggested that nuclear terrorism presented a growing risk, such as the 1982 sabotage attacks on the Koeberg Nuclear Power Plant in South Africa sponsored by the African National Congress (ANC).[14]

First Legal Instrument

By the mid-1970s, there was growing international consensus that collective action was needed on nuclear security and, decisively, this was supported by both superpowers. In 1972, the IAEA had published a booklet by a group of experts titled *Recommendations for the Physical Protection of Nuclear Material*. This text became the basis of subsequent international efforts to formalize the requirement for states to secure nuclear materials. In 1976, the text was published as an IAEA guidance document, 'Information Circular 225 (INFCIRC/225)—The Physical Protection of Nuclear Material'. INFCIRC/225 underwent five further revisions—in 1977 (Rev.1), 1989 (Rev.2), 1993 (Rev.3), 1999 (Rev.4), and 2011 (Rev.5).

While not legally binding, INFCIRC/225 represented a key milestone in the evolution of global nuclear security governance. It provided recommendations on best practices in physical protection, and, for the first time, nuclear materials were categorized against levels of protection.[15] American 'norm entrepreneurship' was catalytic in the establishment of these early foundations of nuclear security governance. Washington was keen to improve global physical protection standards and sought to establish a close working relationship with the IAEA, amid political sensitivities about imposing additional nuclear governance requirements on other states in a top-down approach.

INFCIRC/225 paved the way for the first legal instrument on nuclear security. Adopted in 1979, the Convention on the Physical Protection of Nuclear Material (CPPNM) is a multilateral treaty with provisions for the physical protection of nuclear material. The CPPNM, which entered into force in 1987, was originally conceived with wide-ranging conditions on all non-military nuclear materials, associated facilities, and their transport. However, the scope of the final agreement was narrowed in order to gain consensus and covered only civilian nuclear material in international transit—widely understood as 'the weakest link in the fuel cycle from the standpoint of vulnerability to theft and diversion'.[16]

Despite this emergence of a 'nuclear security regime', the CPPNM was of limited scope and lacked verification mechanisms. Perceptions of the threat also varied between states. Compared with the established non-proliferation regime—built on the NPT and globally recognized safeguards—nuclear security lacked the same concern internationally. As would prove with later efforts, the difficulty in

achieving consensus meant nuclear security initiatives have tended to be either non-binding or deficient in substance. Notwithstanding its shortcomings, the convention still provides a baseline international guide in the area of physical protection and has the highest number of states parties for a legally binding nuclear security agreement. The CPPNM also retains a close symbiotic relationship with INFCIRC/225; the CPPNM ensures states protect nuclear material to a certain standard while INFCIRC/225 provides the necessary set of prescriptive recommendations against which states can be judged.[17] INFCIRC/225 and the CPPNM can thus be considered nuclear security's normative genesis.

Two subsequent nuclear accidents highlighted the linkage between nuclear safety and nuclear security: the 1979 partial meltdown of the Three Mile Island nuclear reactor in the US; and the 1986 meltdown and radiation release at the Chernobyl power plant in Ukraine (then part of the Soviet Union). The two disasters ultimately led to two international conventions on ensuring prompt notification of a nuclear incident and facilitating emergency assistance for any country facing a nuclear disaster: the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, both adopted in 1986. These legally binding agreements also apply to deliberate acts, and thus can be considered as contributing to the consolidation of nuclear security governance.

Nuclear Leakage and the Advent of 'New' Terrorism, 1990s

Post-Cold War Proliferation Risks

With the end of the Cold War in the late 1980s, the strategic environment changed dramatically. Although the risk of an East–West nuclear exchange abated, the new security environment was far from stable with the Soviet Union's dissolution leaving behind a sprawling complex of military and civilian nuclear facilities. Almost overnight, the newly independent governments of Russia, Ukraine, Kazakhstan, and Belarus inherited nuclear research, production, and storage facilities, as well as so-called 'secret cities' housing thousands of nuclear personnel. Alongside civilian infrastructure was a vast arsenal of nuclear weapons. Prior to its collapse, the Soviet Union had over 27,000 nuclear weapons and enough weapons-grade plutonium and HEU to triple that number.[18]

The Soviet Union's dissolution also triggered a severe economic crisis. Amid deep cuts to public spending, nuclear infrastructure fell into disrepair while regulatory bodies were severely compromised in their monitoring and enforcement capacities. Safeguarding of high-grade nuclear materials and the security controls at nuclear facilities lapsed. The profound economic and political turbulence also triggered rampant corruption in public institutions and a surge in organized crime. Hitherto well-paid nuclear workers were laid off or faced months-long delays to their wages.[19]

Inevitably, international concerns grew about poorly secured nuclear weapons being potentially traded on the black market (so-called 'loose nukes'). The actual market for such material was unclear but it was initially thought to include aspiring nuclear weapons states, particularly North Korea, Libya, and Iran.[20] With the benefit of hindsight it appears that the loose nukes threat was somewhat exaggerated. Nevertheless, the potential diversion of civilian nuclear materials, technology, and sensitive information was no longer abstract. The vast borders of the former Soviet Union (FSU) had become relatively porous, while lapsed security controls meant any stolen nuclear materials were unlikely to return to regulatory control.

The threat was characterized by an incident involving a nuclear engineer, Leonid Smirnov, who smuggled 1.5 kg of HEU out of a state research laboratory near Moscow. Caught in October 1993 before finding a buyer, Smirnov had siphoned out minuscule amounts over several months to avoid detection.[21] A series of nuclear

smuggling incidents subsequently came to light, including the case of a Russian naval officer illegally appropriating 4.5 kg of HEU in Murmansk.[22] It was in this context of fear over new routes to nuclear proliferation that nuclear security became a more pressing priority for the international community. Progress was again primarily driven by US norm entrepreneurship, both in terms of identifying and publicizing the dangers emanating from the FSU and taking steps to counter them.

Cooperative Threat Reduction

Fears about nuclear leakage from the FSU to rogue states led to an array of policy initiatives, aimed at both securing chemical, biological, radiological, and nuclear (CBRN) materials and stabilizing the Soviet military during a time of transition. Washington funded and implemented the majority of these initiatives, although progress would not have been possible without Russia's collaboration. In December 1991, the George H. Bush administration signed the Soviet Nuclear Threat Reduction Act. The programme of work mostly focused on non-proliferation assistance and threat reduction—the most well-known being 'Cooperative Threat Reduction' (CTR).[23] Of direct relevance to nuclear security was the emphasis in many of the programmes on improving physical protection.

The various post-Cold War initiatives in the FSU were largely successful in reducing nuclear weapons arsenals and strengthening nuclear security at civilian facilities. Nevertheless, not all objectives were fulfilled because of apparent mismanagement and bureaucratic inertia within the FSU. One report even argued the assistance programmes may have eased Russian budgetary woes and enabled defence modernization.[24] Yet, against the odds, the US and Russia utilized a narrow window of opportunity to forge an unexpected partnership over nuclear security that shaped the international regime over the coming decade.

Dawn of 'New Terrorism'

By the 1990s, fears were growing in the international community that terrorists might seek to acquire CBRN materials. While terrorists had already proved themselves capable of launching mass casualty attacks and operating across borders, this so-called 'new terrorism' was characterized by an apparent willingness to employ non-conventional weapons to achieve apocalyptic ends.[25] No longer focused on traditional goals of national liberation or revolution, these 'new' terrorists—most prominently jihadist militant movements nascent in the Middle East—were driven by existential desires related to ideology and religion; the risk of alienating their supporters through indiscriminate killing had apparently ceased to be a deterrent. The arrival of the internet also meant sensitive CBRN information was potentially accessible to would-be terrorists.

A sarin attack in March 1995 by a religious doomsday cult in Japan, Aum Shinrikyo, highlighted the threat from non-state actors and unconventional weapons. In coordinated attacks, Aum adherents punctured packets of sarin with umbrellas to disperse the nerve agent across the Tokyo metro system, killing 13 and injuring hundreds more.[26] The use of a nerve agent broke an implicit taboo about the use of CBRN weapons. It later emerged that Aum Shinrikyo had produced the sarin itself and had experimented with developing botulinum and anthrax.[27]

Following the coordinated terrorist attacks on two US embassies in East Africa in 1998 and on the USS Cole in 2000, global attention turned to Osama bin Laden and his jihadist militant group, al-Qaeda. US intelligence reports indicated that al-Qaeda harboured an interest in CBRN weapons, leading the US to broaden its FSU activities from narrow non-proliferation efforts to encompass CBRN security. More generally, the attacks thrust the issue of unconventional terrorism into the policy spotlight. Compared to the tangible concerns about nuclear attacks and mutually assured destruction that characterized the Cold

War, the risk of a terrorist nuclear attack was much harder to quantify—and therefore more difficult to defend against.

IAEA Headway on Nuclear Security Governance

Against this backdrop, the IAEA expanded its nuclear security role during the 1990s. A notable development was updating INFCIRC/225/Rev.2 to reflect the security environment and evolving policy architecture. It had become clear that vast implementation differences remained between states, despite INFCIRC/225 being the global reference point for physical protection. INFCIRC/225/Rev.3, published in 1993, was another significant development as it now included guidance on appropriate regulatory systems. It also went beyond the CPPNM by incorporating the concept of in-depth or layered protection aligned to the category of nuclear material.[28]

At the behest of the US, INFCIRC/225/Rev.4, published in 1999, incorporated for the first time the concept of the 'design basis threat' (DBT).[29] The state was still responsible for the evaluation of the threat, but the US had successfully institutionalized the DBT via the IAEA. The recognition that nuclear facilities required a specific threat assessment demonstrated the importance of US leadership in setting global standards. There were also additional provisions in INFCIRC/225/Rev.4 for preventing nuclear sabotage and, for the first time, for facilities specifically. In the wake of Chernobyl, there was also an extra clause on the 'release of radioactive substances'.[30] These developments reflected heightened fears about radiological terrorism and sabotage of nuclear reactors.

In 1995, the IAEA created the Illicit Trafficking Database—later renamed the Incident and Trafficking Database (ITDB). The ITDB records incidents of illicit trafficking of nuclear and radioactive materials dating from 1993 onwards and has made a significant contribution to the monitoring of nuclear smuggling and materials outside of regulatory control. Also in 1995, the IAEA formed the International Physical Protection Advisory Service (IPPAS). Performed around the world at the request of states, IPPAS missions provide an international peer review of the physical protection arrangements at nuclear facilities, identifying weaknesses, and assisting in rectifying them. The aim is to facilitate a more standardized approach to the domestic implementation of INFCIRC/225.

The earliest terrorism treaty containing nuclear security-related obligations was the International Convention for the Suppression of Terrorist Bombings, adopted by the UN General Assembly in 1998. However, by the end of the millennium it was evident there were gaps in the international policy architecture regarding terrorism, and that new instruments were required. The international community was committed to nuclear security, but the focus was still largely on the safeguards regime as the foremost tool to prevent illicit trafficking and improve NMAC.

Post-9/11 Period, 2000s

'War on Terror'

The events of 11 September 2001 ('9/11') profoundly influenced the global security environment and gave new impetus to concerns about nuclear terrorism. Al-Qaeda had proven its ability to circumvent what were previously considered robust civil aviation security measures in the continental US to launch synchronized attacks using commercial aircraft. During the 1990s, the militant jihadist group had indicated interest in CBRN materials. Now concerns were heightened about this 'potential conjunction of terrorism and WMD [weapons of mass destruction]', elevating risk calculations.[31] Yet without hard evidence, others argued such narratives were alarmist.[32]

The 9/11 attacks prompted a flurry of policy making, giving rise to new international norms to complement pre-existing standards for physical protection and nuclear safety. Most notably, the UN Security Council adopted two binding Resolutions: 1373 and 1540. Resolution 1373, agreed unanimously two weeks after the attacks, set out unprecedented measures on countering terrorism and, for the first time, included a focus on nuclear materials. Specifically, 1373 noted 'the close connection between international terrorism and transnational organized crime, illicit drugs, money-laundering, illegal arms-trafficking, and illegal movement of nuclear, chemical, biological and other potentially deadly materials'.[33] While there was no direct intelligence indicating an imminent CBRN terrorist threat, statements of intent by al-Qaeda to acquire WMD no longer seemed far-fetched. The A. Q. Khan network, centred in Pakistan, also highlighted the role of non-state actors in WMD proliferation as both suppliers and recipients of weapons and technologies.[34]

The existing non-proliferation regime appeared incapable of addressing these emerging proliferation risks, and a new means of tackling the threat was required. In this context, the Security Council unanimously adopted Resolution 1540 in April 2004. This was a comprehensive resolution requiring states to implement appropriate measures to ensure the security of 'nuclear, chemical or biological weapons', with specific provisions on physical protection, material accountancy and control, and border controls.[35] Of note, radiological materials were not explicitly referenced.[36]

Adopted under Chapter VII of the UN Charter, 1540 includes a mandate for a committee to oversee its implementation. However, the 1540 Committee largely relies on voluntary reporting by states and, due to an absence of verification or effective enforcement provisions in the resolution, lacks authority to carry out an effective oversight role. Still, 1540 does much to mitigate the threat of non-state actors acquiring WMD or the means to develop them and has become a cornerstone of nuclear security efforts. 1540's mandate has been extended several times by further resolutions: UNSCR 1673 (2006), UNSCR 1810 (2008), and UNSCR 1977 (2011).

Perceptions of the CBRN terrorist threat were exacerbated by the delivery of anonymous letters containing the biological agent anthrax to various locations across the US just a week after the 9/11 attacks. Posted to senators, media outlets, and other targets, the anthrax letters killed five people and injured another 17. The subsequent investigation represented the most expensive in American history and led biodefence funding to surge the following year to US$4 billion, up from US$633 million.[37]

In the wake of 9/11, governments across the world, but particularly in North America and Europe, strengthened domestic security legislation and enhanced intelligence capabilities and border security. Established supplier groups of nuclear material also adjusted their control lists and adopted language aimed at preventing illicit acquisition of WMD-related materials.[38] In the US, objective concerns about nuclear terrorism were sensationally packaged as part of the broader 'War on Terror' and played into Washington's justification for the 2003 invasion of Iraq. Arguably, this environment of heightened anxiety prompted the most innovative period in the evolution of nuclear security governance.

Catalyst for IAEA Initiatives

In this environment, the IAEA was able to elevate itself as an institutional actor in the field of nuclear security—playing the role of a non-partisan, expert-led organization, and thereby carrying legitimacy amid perennial tensions between the nuclear and non-nuclear powers. In 2002, the IAEA launched several initiatives. First, to support its work in assisting Member States, the IAEA created a Nuclear Security Plan (NSP), to be implemented by a newly formed Office of Nuclear Security. Renewed every four years, the NSP sets out the IAEA's future priorities and implementation strategy. Second, the IAEA developed Integrated Nuclear Security Support Plans (INSSPs). INSSPs provide ad hoc support to individual states by outlining improvements required in the area of physical protection. And third, to finance its expanded activities, the IAEA created a new funding mechanism, the Nuclear Security Fund (NSF), based on voluntary donations from states.

Another example of the IAEA's expanding role was its promotion of radiological source security. Awareness of the CBRN threat was increasing internationally. In 2004, the IAEA published the Code of Conduct on the Safety and Security of Radioactive Sources ('the Code'). The Code sets out guidelines for national authorities to ensure radiological sources are adequately protected. Despite the majority of states being signatories, the Code is not a legally binding agreement but represents 'soft law' where parties are simply expected to observe good conduct. Arguably, there was greater incentive for most states to push the radiological source security agenda because it is more universal than nuclear terrorism, given almost all countries used radiological sources in medicine, industry, and agriculture.

Another IAEA initiative was its fifth revision of INFCIRC/225. Published in January 2011, this was 'an evolutionary, not revolutionary' update intended to harmonize INFCIRC/225 with the CPPNM and other Nuclear Security Series documents.[39] While changes incorporated in this version were less substantial than those made in previous ones, INFCIRC/225/Rev.5 includes revised guidance on how to categorize self-protecting nuclear material when applying physical protection measures. This was an acknowledgment that adversaries may be willing to receive damaging or even lethal doses of radiation in order to accomplish their mission—a nod to the events of 9/11.

The IAEA's expanded engagement helped raise awareness about nuclear security, with its reach going beyond the smaller groupings of like-minded states on which the Bush administration was focusing diplomatic efforts. The IAEA was also instrumental in issuing recommendations about best practice, particularly in the area of physical protection. Yet, the IAEA's potential to socialize norms and encourage states to develop binding commitments was hindered by still significant resistance in some quarters. While initial pledges to the NSF had been promising, then-IAEA director general Mohamed ElBaradei revealed these did not translate into received donations, leaving the US to underwrite the majority of initiatives.[40]

Global Partnership and East–West Diplomacy

In the wake of 9/11, Washington was highly successful in engaging like-minded states in plurilateral non-binding arrangements to achieve a specific set of policy goals related to the CBRN threat. These were designed to fill gaps in the existing nuclear security architecture, albeit an increasingly complex architecture characterized by overlapping objectives. Most prominent among such arrangements was the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction ('Global Partnership'). Launched in 2002 at the G8 Summit, the Global Partnership aimed 'to prevent terrorists, or those that harbour them, from acquiring or developing nuclear, chemical, radiological and biological weapons; missiles; and related materials, equipment and technology'.[41]

The scale of funding and technical expertise committed to the Global Partnership was unprecedented. The US, as principal sponsor, committed a total of US$10 billion for the initial 10-year mandate. Urged by

Washington, other G8 members, several other states, and the EU collectively pledged a further US$10 billion.[42] The Global Partnership built on pre-9/11 threat reduction efforts, first focusing on the considerable inventory of CBRN materials in Russia and other parts of the FSU, then expanding to include wider countries of interest. Underscoring its importance, the Global Partnership was renewed beyond its original 10-year mandate. However, Russia stopped participating following its suspension in March 2014 from the G8, in response to 'Russia's violation of Ukraine's sovereignty and territorial integrity'.[43]

The Global Partnership undoubtedly contributed to international security by decreasing CBRN stockpiles, implementing physical security measures, and promoting security culture. Nevertheless, as a non-legally binding, plurilateral initiative, and reliant on access agreements between funders and recipient states, the Global Partnership suffered from lack of coordination. It was not always clear if programmes were based on the greatest need and would deliver long-term solutions.

Shared nuclear security concerns led the US and Russia to announce a new joint initiative in July 2006, the Global Initiative to Combat Nuclear Terrorism (GICNT),[44] which was not a formal treaty organization, but rather one designed as an overarching programme to raise international awareness of the now elaborate nuclear security architecture. It called on governments to commit to implementing existing nuclear security legislation to mitigate the threat of nuclear terrorism. In effect, GICNT relied on norms to encourage states to consent voluntarily to nuclear security standards despite not being legally bound to these.

In May 2003, the US launched the Proliferation Security Initiative (PSI)—'a response to the growing challenge posed by the proliferation of weapons of mass destruction (WMD), their delivery systems, and related materials worldwide'.[45] The PSI was developed in response to an incident the previous December when the crew of a Spanish warship off the Yemeni coastline intercepted a shipment of scud missiles and chemical propellant purportedly from North Korea. Despite the implications for WMD proliferation, no breach of any law had been committed.[46]

Under the PSI, governments commit to non-binding Statement of Interdiction Principles, which set out a coordinated approach to interdicting WMD, delivery systems, and related materials being transferred to or from state or non-state actors of proliferation concern. The PSI has been adopted by more than half of the world's governments. However, implementation relies on participating states employing domestic tools, which poses 'myriad potential political, legal, operational, and informational hurdles'.[47] Some states—most notably China—have disputed the legality of the proposed interdictions.

Legally Binding Entrepreneurship

In this industrious policy-making period, the international nuclear security architecture evolved into a complex web of legally binding conventions, with gaps filled by an array of informal initiatives. Even before 9/11, it was clear that existing nuclear security agreements required updating—most obviously the CPPNM—to reflect both technical developments and the post-Cold War security environment. In June 2001, the IAEA had established a group of legal and technical experts to draft an Amendment to the CPPNM ('A/CPPNM'). But despite the group convening six times, the draft failed to generate consensus.[48] In response, 25 states parties to the CPPNM subsequently produced their own amendment.

Negotiations remained thorny not least because it was feared an additional protocol to the original convention would undermine the existing legislative framework and create parallel or incompatible regimes.[49] Washington also wanted to go further by using the mandatory acceptance of INFCIRC/225 as a baseline of physical protection standards and obligations for states to self-report to the IAEA on physical protection measures.[50] However, some states, including the UK, possessed large stockpiles of civilian plutonium that would fall under this proposal, and resisted. In this context, several governments advocated reinforcing the CPPNM by enlarging its membership and strengthening its application through existing

signatories.[51] For other states, including Russia, the prevailing legislation was insufficient and unable to prevent nuclear terrorism in all its manifestations.

Ultimately, the A/CPPNM was adopted by all parties in July 2005. The A/CPPNM broadened the scope of the original convention text, making it a legal obligation for states to protect the domestic use, storage, and transportation of civilian nuclear material. The A/CPPNM also advanced cooperation among states regarding rapid measures to locate and recover smuggled or stolen material and to mitigate the radiological consequences of sabotage. Furthermore, once a suitable legislative framework is established in a state, it requires implementation by a responsible national authority. The convention and its amendment remain the only legally binding international instruments on the physical protection of nuclear and radioactive materials.

Another milestone in the evolution of nuclear security governance was the adoption in April 2005 of the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), which entered into force in July 2007 and was designed to criminalize acts of nuclear terrorism and encourage international coordination that would deter, investigate, and prosecute such acts. ICSANT had its roots in debates during the 1990s when policy makers were exploring additional methods to prevent unconventional activities by non-state actors.[52] In 1996, Russia drafted a document that formed the basis of the subsequent ICSANT agreement. However, negotiations over the proposal were complicated, in part as it was feared another initiative would undermine and dilute the existing nuclear security architecture. There were also concerns over respect for state sovereignty, and whether the document's wording might be interpreted as legitimizing the use of nuclear weapons.[53]

By incorporating 'the broadest possible definition of terrorist acts related to the use, or threat of use, of nuclear components,' ICSANT was designed to counter threats by individuals or organizations, regardless of the target.[54] Some states had already amended domestic legislation following 9/11. But ICSANT required all parties to make certain acts criminal offences in domestic law, to establish jurisdiction over such offences, and to prosecute or extradite persons alleged to have committed the defined criminal offences.[55] The requirement for domestic legal changes helped grow the uptake of norms associated with nuclear security. There was also now greater crossover with counter-terrorism policy. Provisions in the previous conventions had only applied to nuclear materials being transported across borders, or being used, stored, or transported in a given state; thus ICSANT helped to plug the gaps and complemented UNSCR 1540. ICSANT also broadened 'ownership' of the issues by being introduced at the UN, where all states could negotiate over the scope of the text.

Nuclear Summitry and Beyond, 2010s–present

Prague Agenda and the NPT pillars

Barack Obama's electoral victory in November 2008 gave huge momentum to international nuclear security efforts. Early in his presidency, the US president declared a vision of global nuclear disarmament during a speech in Prague.[56] The 'Prague speech', as it became known, emphasized that nuclear security was at the top of America's foreign policy agenda, with Obama warning nuclear terrorism was an 'immediate and extreme threat' that required a global response.[57] He proposed a 'new international effort to secure all vulnerable nuclear material around the world within four years.'[58] Obama also announced renewed efforts to disrupt nuclear smuggling and intercept sensitive materials at borders.[59] The Prague speech provided the origin for the Nuclear Security Summits, a series of four inter-governmental conferences on nuclear security held from 2010–2016.

Prior to the inaugural 2010 summit, international differences over how nuclear security fitted with the non-proliferation regime came to a head. The US and UK sought to reinvent nuclear security as a 'fourth pillar' of the NPT—equivalent to the three existing pillars of disarmament, non-proliferation, and peaceful uses of nuclear energy.[60] It was envisaged that insulating nuclear security from broader nuclear weapons politics by reconstituting it as a separate pillar would lead to heightened engagement by those states critical of the slow pace of disarmament. However, this idea backfired with the Non-Aligned Movement (NAM), which contained several nuclear newcomer states, objecting to what they perceived as additional obligations being imposed on their inalienable right to nuclear energy.[61] The fourth pillar concept was subsequently abandoned by the US and UK. In the run-up to the summit, emphasis was placed instead on state-level responsibility and the centrality of the IAEA. It was also recognized that progress could only be achieved by the international community working together on the basis of common interests.

Nuclear Summitry

The four Nuclear Security Summits aimed to mitigate the threat of nuclear terrorism and enhance the security of nuclear and radioactive materials around the world. The 2010 summit was hosted by Washington; the 2012 summit was hosted by Seoul, South Korea; the 2014 was hosted by The Hague, Netherlands; and the concluding 2016 summit returned to Washington. Underscoring their significance, the summits represented the largest gathering of world leaders since the UN Conference on International Organization in 1945. While the legacy of the summits is mixed, they helped to consolidate a global consensus over the threat of nuclear terrorism and provided a catalyst for governments to take concrete steps, thereby strengthening international nuclear security governance.

The overarching policy agenda remained the same throughout the summits but there were several notable developments. Reflecting Obama's preoccupation with nuclear terrorism, the summit process initially focused on the scenarios of extremists acquiring fissile materials to launch mass-casualty attacks; at the later summits a broader range of scenarios featured, including the unauthorized acquisition of radiological sources; during the 2012 summit, the safety–security interface came to the fore, reflecting international concern over the 2011 Fukushima nuclear disaster; at the 2016 summit, Russia did not participate amid tensions with Western governments after its annexation of Crimea. A key trend to emerge over the course of the summits was the progressive expansion in commitments pledged by states, totalling more than 935 individual voluntary state actions.[62]

Indeed, the summit process can be said to have pioneered a novel implementation mechanism where states were motivated to make ambitious—albeit non-binding—commitments in the form of (national) 'house gifts' or (multilateral) 'gift baskets'. These were voluntary commitments but there was an implicit expectation that progress would be analysed by the international community at each subsequent summit, thereby motivating implementation.[63] With a greater number of states adopting nuclear security agreements, the corresponding standards became embedded into national regulations and laws.[64] The summits thus acted as a catalyst in consolidating international nuclear security norms.

A key milestone was the uptick in states approving the A/CPPNM, which reached the threshold to enter into force in May 2016.[65] Similarly, there was a substantial increase in new ratifications of ICSANT. Meanwhile, the number of countries that possessed weapons-usable material (defined as holding 1 kg or more) went from 35 when the process began to 24 when it ended.[66] States also took action to down-blend a substantial amount of HEU to low enriched uranium (LEU) and convert separated plutonium to mixed oxide (MOX) fuel.[67] Other achievements included the creation of new nuclear security training centres, increased contributions to the NSF, and Russia's cessation of plutonium production. Another landmark was achieved by the joint proposal 'Strengthening Nuclear Security Implementation' (SNSI), which obliged signatories to commit to implementing IAEA recommendations. SNSI was subsequently adopted by the IAEA as

INFCIRC/869. By giving the force of law to these non-binding recommendations, signatories were contributing to norm development and helping to strengthen international nuclear security governance.

As the process wore on, tangible progress was becoming harder to achieve, while the overlap with non-proliferation politics remained a source of contention. Meanwhile, those states not invited to the summits were increasingly vocal.[68] There were also no formal mechanisms established to evaluate the implementation of commitments once the process ended. Above all, actions by states remained predominantly motivated by national interests, making any ambitious future agreements unlikely, such as the comprehensive 'International Convention on Nuclear Security' touted in 2015 by the Nuclear Security Governance Experts Group (NSGEG).[69] At the final summit, the emphasis was on enhancing the normative elements of nuclear security by communicating expected behaviour and best practice.

Beyond the Summit Process

Following the summits, in parallel with actions by states the agenda was integrated into five separate 'Action Plans' to be implemented by the IAEA, UN, Global Partnership, GICNT, and Interpol. It was envisaged that these successor schemes would provide a governance framework for sustaining the summits' ambitions. However, the Actions Plans required neither a formal reporting process nor did they identify funding arrangements—resulting in no guarantee of long-term sustainability. Moreover, the momentum achieved through the enactment of progressive and ambitious commitments—on which governments would be nominally answerable—was not replicated in the Action Plans or any post-summit initiative.

Perhaps inevitably, the pace of policy development on nuclear security slowed after the summits ended. The IAEA's triennial International Conference on Nuclear Security (ICONS) sought to fill this gap. Together with the IAEA's annual General Conferences, these events are now the principal forums for government-level engagement on nuclear security by bringing together ministers, experts, and international organizations. Other mechanisms continue to shape nuclear security governance such as the Nuclear Security Contact Group (NSCG), which works to implement the summit commitments. Responding to the lack of verifiable policy implementation, the US-based Nuclear Threat Initiative (NTI) created a Nuclear Materials Security Index designed to encourage states to improve their ranking, according to several criteria, and generally improve transparency.

The most recent development for global nuclear security governance was the Review Conference of the A/CPPNM in March-April 2022. Pursuant to Article 16.1, the conference had to take place within five years of A/CPPNM coming into force (albeit being a year late due to the Covid-19 pandemic). The conference reviewed implementation of the legislation and discussed its continuing adequacy in light of the security environment and new technologies. There is potential for this conference structure to be maintained on a regular basis, akin to the NPT review conferences held every five years.[70] Such a development would formalize the only international forum for a nuclear security instrument with a legal mandate.

Despite such persistent efforts, however, the plethora of post-summit initiatives has arguably resulted in a refragmentation of the policy landscape. The number of new actors and organizations working on nuclear security increased but crucially absent in the post-summit period is an ongoing mechanism for political commitment at the inter-government level. The Nuclear Security Summit process illustrated that close engagement by states is crucial for making a tangible impact.

Conclusion

The business of strengthening nuclear security governance is far from complete. This chapter demonstrates how major governance gaps remain and how the international architecture is characterized by complex and overlapping structures. There are still no comprehensive international standards or best practices that all states must follow, implementation of legal instruments is not universal, verification and monitoring mechanisms are largely absent, and the current system does not extend to the vast majority of the world's weapons-usable nuclear material that is under military control.

Historically, major world events have triggered reactive policy making on nuclear security. Yet while broad international engagement suggests nuclear security has acquired a normative element, the embedding of governance structures into an international system remains fundamentally dependent on shifting national appetites. US leadership, as a 'norm entrepreneur', has helped strengthen governance structures and unequivocally solidified international consensus. Nevertheless, while broad uptake of a binding agreement might enhance the normative aspect of nuclear security, this does not automatically equate to implementation where it matters most at the facility-level.

Ambitions for future binding agreements seem distant at the current juncture, primarily because the construction of nuclear security as a state-level responsibility is so entrenched. Perceptions of the threats diverge profoundly around the world and many nuclear newcomer states still perceive nuclear security initiatives as further bureaucratic hurdles. Nuclear security is also inherently complicated by debates around disarmament. In many ways, the international architecture on nuclear security still represents an uneasy compromise between the converging preferences of states.[71] The extent to which nuclear security norms are truly internalized by states will thus remain limited, absent a major shock such as a nuclear terrorist event. But it is not just terrorist groups that can exploit civil nuclear infrastructure in pursuit of their objectives. Russia's exploitation of nuclear facilities for tactical advantage in its war of aggression against Ukraine – most alarmingly at the Zaporizhzhia Nuclear Power Plant – has demonstrated the willingness of one of the world's most significant civil and military nuclear powers to entirely discard safety and security norms for its own gains. It remains to be seen whether the war in Ukraine will strengthen or undermine international cooperative efforts to strengthen nuclear security going forward.

Suggested Reading

Barrow, Alex, Bowen, Wyn, Cottee, Matthew, Hobbs, Christopher, Lentini, Luca, Moran, Matthew, and Tzinieris, Sarah, (2022), *Nuclear Security Briefing Book*, 2022 Edition. (London: King's College London).
Google Scholar Google Preview WorldCat COPAC

Bowen, Wyn, Cottee, Matthew, and Hobbs, Christopher, (2012), 'Multilateral Cooperation and the Prevention of Nuclear Terrorism: Pragmatism over Idealism', *International Affairs*, 88/2, 349–68.
Google Scholar WorldCat

Bunn, Matthew, Roth, Nickolas, and Tobey, William H., (2019), *Revitalizing Nuclear Security in an Era of Uncertainty* (Cambridge, MA: Harvard Kennedy School: Belfer Center for Science and International Affairs).
Google Scholar Google Preview WorldCat COPAC

Kutchesfahani, Sara Z., Davenport, Kelsey, and Connolly, Erin, (2018), *The Nuclear Security Summits: An Overview of State Actions to Curb Nuclear Terrorism 2010-2016*, Arms Control Association and Fissile Material Working Group Report (Washington, DC: ACA)

Schelling, Thomas, (1976), 'Who Will Have the Bomb?', *MIT Press*, 1/1, 77–91.
Google Scholar WorldCat

Notes

1 Definition by the *Concise Oxford Dictionary of Politics*, (Oxford: Oxford University Press, 2009).

2 Martha Finnemore and Kathryn Sikkink, 'International Norm Dynamics and Political Change', *International Organization*, 52/4 (1998), 887–917.

3 Kai Bird and Martin J. Sherwin, *American Prometheus* (New York: Knopf, 2005).

4 Lorna Arnold, *Windscale 1957: Anatomy of a Nuclear Accident* (Basingstoke: Palgrave Macmillan, 1995), 154; Richard Wakeford. 2007 'The Windscale Reactor Accident—50 years on'. *Journal of Radiological Protection*. Vol. 27. pp. 211–15.

5 Mason Willrich and Theodore B. Taylor, 'Nuclear Theft: Risks and Safeguards', *Political Science Quarterly*, 90/1 (1975), 79.

6 US Atomic Energy Commission, *Report to the Atomic Energy Commission by the Ad Hoc Advisory Panel on Safeguarding Special Nuclear Material* (Washington, DC: AEC, 1967), 4.

7 Ibid.

8 Bruce G. Blair and Gary D. Brewer, 'The Terrorist Threat to World Nuclear Programs', *The Journal of Conflict Resolution*, 21/3 (1977), 379.

9 Thomas Schelling, 'Who Will Have the Bomb?', *MIT Press*, 1/1 (1976), 77–91.

10 Willrich and Taylor, 'Nuclear Theft', 80.

11 Ibid.

12 Brian Jenkins, 'International Terrorism: A New Mode of Conflict', in David Carlton and Carlo Schaerf, eds., *International Terrorism and World Security* (London: Croom Helm, 1975).

13 John Hannam, 'Atomic Energy Authority (Special Constables) Bill', *Hansard (House of Commons)*, 906, 26 February 1976, Cols 701–55. http://hansard.millbanksystems.com/commons/1976/feb/26/atomic-energy-authority-special

14 Jo-Ansie van Wyk, 'The ANC's Operation Mac and the attack on the Koeberg Nuclear Power Station in South Africa', *Historia*, 60/2 (2015). http://dx.doi.org/10.17159/2309-8392/2015/V60N2A3.

15 Christopher Price. 'Development of the IAEA Nuclear Security Recommendations on Physical Protection of Nuclear Materials and Nuclear Facilities (INFCIRC/225/Rev.5)', *Journal of Nuclear Materials Management*, XXXIX/3 (2011), 11.

16 Samuel J. Walker, 'Regulating against Nuclear Terrorism', *Technology and Culture*, 42/1 (2001), 115.

17 Craig Everton, Stephan Bayer, and John Carlson, 'Developments in the IAEA's Nuclear Security Series and Physical Protection Guidance Document INFCIRC/225', Paper presented to the Annual Meeting of the INMM, Baltimore, 11–15 July 2010..

18 Council on Foreign Relations, 2006, 'Loose Nukes'.

19 William Langewiesche, 'How to Get a Nuclear Bomb', *The Atlantic*, December 2006.

20 Alex P. Schmid, 'Terrorism and The Use of Weapons of Mass Destruction', *Terrorism and Political Violence*, 11/4 (2007), 116.

21 PBS, 1996. Interview with Leonid Smirnov.

22 Jane Perlez, 15 February 1995. 'Tracing a Nuclear Risk: Stolen Enriched Uranium', *The New York Times* [online], 15 February 1995. https://www.nytimes.com/1995/02/15/world/tracing-a-nuclear-risk-stolen-enriched-uranium.html

23 Defense Threat Reduction Agency. 2006. 'Cooperative Threat Reduction'.

24 Rich Kelly, 'The Nunn-Lugar Act: A Wasteful and Dangerous Illusion'. Foreign Policy Briefing, No. 39. *Cato Institute* [online], 18 March 1996. https://www.cato.org/foreign-policy-briefing/nunn-lugar-act-wasteful-dangerous-illusion#

25 Martha Crenshaw, 'The Psychology of Terrorism: An Agenda for the 21st Century', *Political Psychology*, 21/2 (2000), 405–20.

26 Schmid, 'Terrorism and The Use of Weapons of Mass Destruction', 126.

27 Richard Danzig, et al., *Aum Shinrikyo: Insights Into How Terrorists Develop Biological and Chemical Weapons* (Washington, DC: CNAS, 2012).

28 Bonnie D. Jenkins, 'Establishing International Standards for Physical Protection of Nuclear Material', *The Nonproliferation Review*, 5/3 (1998), 100.

29 Author correspondence with former government official involved in the drafting of INFCIRC/225/Rev.4, September 2014.

30 IAEA, *The Physical Protection of Nuclear Materials and Nuclear Facilities (INFCIRC/225/Rev.4)* (Vienna: IAEA, 1999), 2.

31 Harald Müller, Marco Fey, and Carsten Rauch, 'Winds of Change: Exogenous Events and Trends as Norm Triggers (or Norm Killers)', in Harald Müller and Carsten Wunderlich, eds., *Norm Dynamics in Multilateral Arms Control* (Athens: University of Georgia Press, (2013), 151.

32 John Mueller, *Atomic Obsession: Nuclear Alarmism from Hiroshima to Al-Qaeda* (Oxford: Oxford University Press, 2010).

33 UN Security Council. 28 September 2001. Resolution 1373.

34 Peter Crail, 'Implementing UN Security Council Resolution 1540', *The Nonproliferation Review*, 13/2 (2006), 355–99.

35 UN Security Council, 28 April 2004, Resolution 1540.

36 Ibid.

37 Aidan McCarty, 'Changes in U.S. Biosecurity Following the 2001 Anthrax Attacks'. *Journal of Bioterrorism & Biodefense* [online], 9/2 (2018). DOI: 10.4172/2157-2526.1000163

38 Todd Perry, 'The Growing Role of Customs Organizations in International Strategic Trade Controls', in James Doyle, ed., *Nuclear Safeguards, Security and Nonproliferation* (Oxford: Elsevier, 2008), 550.

39 Everton et al., 'Developments in the IAEA's Nuclear Security Series and Physical Protection Guidance Document INFCIRC/225'.

40 ElBaradei, *The Age of Deception*, 165.

41 Group of Eight Summit, 2002. 'Statement by G8 Leaders: The G8 Partnership Against the Spread of Weapons and Materials of Mass Destruction'.

42 Alan Heyes, Wyn Q Bowen, and Hugh Chalmers. *The Global Partnership Against WMD: Success and Shortcomings of G8 Threat Reduction since 9/11*. RUSI Whitehall Paper Series (Abingdon: Routledge, 2012), 2.

43 Group of Seven Summit, Joint G7 Statement from the Hague on Ukraine (London: Prime Minister's Office, 2014).

44 George W. Bush and Vladimir V. Putin, *Announcing the Global Initiative to Combat Nuclear Terrorism* (Washington, DC: US Department of State Archive, 2006).

45 The White House, *Proliferation Security Initiative: Statement of Interdiction Principles* (Washington, DC: The White House, Office of the Press Secretary, 2003).

46 Paul Kerr, 'U.S. Stops Then Releases Shipment of N. Korean Missiles', *Arms Control Today* [online], January 2003. https://www.armscontrol.org/act/2003-01/news/us-stops-then-releases-shipment-n-korean-missiles

47 Andrew C. Winner, 'The Proliferation Security Initiative', *The Washington Quarterly*, 28/2 (2005),132.

48 Council of the European Union, 2005. 'Proposal for a Council Decision Issuing Directives to the Commission for the Negotiation of the Amendments to the Convention on the Physical Protection of Nuclear Material', Ref 9264/05.

49 Ibid.

50 George Bunn, 'Raising International Standards for Protecting Nuclear Materials from Theft and Sabotage'. *The Nonproliferation Review*, 7/ 2 (2008), 152.

51 UN Press Release L2584, 'UN Ad Hoc Committee Begins Considering Draft Convention to Suppress Nuclear Terrorism Acts', 17 February 1998.

52 Rohan Perera, *International Convention for the Suppression of Acts of Nuclear Terrorism* (New York: Audiovisual Library of International Law, 2005).

53 Sam Kane and Kingston Reif, *Fact Sheet: The 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM) and the International Convention on the Suppression of Acts of Nuclear Terrorism (ICSANT)* (Washington, DC: Center for Arms Control and Non-Proliferation, 2013).

54 UN Press Release L2584, 'UN Ad Hoc Committee Begins Considering Draft Convention'.

55 David P. Fidler, 'International Convention for the Suppression of Acts of Nuclear Terrorism Enters into Force', *Insights*, 11/18 (2007), np.

56 Barack Obama, 'Remarks by President Barack Obama in Prague as Delivered, Hradcany Square, Prague, Czech Republic, 5 April' (Washington, DC: The White House, Office of the Press Secretary, 2009). https://obamawhitehouse.archives.gov/the-press-office/remarks-president-barack-obama-prague-delivered .

57 Ibid.

58 Ibid .

59 Ibid .

60 Hillary Clinton, 'Remarks by Secretary of State Hillary Rodham Clinton at the United States Institute of Peace, Renaissance Mayflower Hotel, Washington, DC, 21 October (Washington, DC: Archive of US Department of State, 2009; Cabinet Office, *The Road to 2010: Addressing the Nuclear Question in the Twenty First Century* (London: HMSO, 2009), 7.

61 Non-Aligned Movement, 2010. '2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons'.

62 Sara Z. Kutchesfahani, Kelsey Davenport and Erin Connolly, *The Nuclear Security Summits: An Overview of State Actions to Curb Nuclear Terrorism 2010-2016*, Arms Control Association and Fissile Material Working Group Report (Washington, DC: ACA, 2018).

63 Michelle Cann, Kelsey Davenport, and Jenna Parker, The Nuclear Security Summit (Washington, DC: Arms Control Association and Partnership for Global Security, 2016).

64 Kutchesfahani et al., 'The Nuclear Security Summits'.

65 Nuclear Security Summits, 2016. 'Statement by National Security Advisor Susan E. Rice on the Entry into Force of the 2005 Amendment to the Convention on Physical Protection of Nuclear Materials'.

66 Houses of Parliament, 2016. 'Nuclear Security', Post Note. UK Parliamentary Office of Science and Technology.

67 Nuclear Security Summit, 2014. 'Communiqué'.

68 Leah Matchett, 'The Controversial Legacy of the Nuclear Security Summit', *Bulletin of the Atomic Scientists* [online], 4 October 2018. https://thebulletin.org/2018/10/the-controversial-legacy-of-the-nuclear-security-summit/

69 John Bernhard, Kenneth C. Brill, Anita Nilsson, and Shin Chang-Hoon, *International Convention on Nuclear Security* (Muscatine, IA: NSGEG, 2015).

70 Jonathan Herbach and Samantha Pitts-Kiefer, 'More Work to Do: A Pathway for Future Progress on Strengthening Nuclear Security', *Arms Control* Today [online], October 2015. https://www.armscontrol.org/ACT/2015_10/Features/More-Work-to-Do-A-Pathway-for-Future-Progress-on-Strengthening-Nuclear-Security.

71 Harald Müller, 'Where It All Began', in Harald Müller and Carmen Wunderlich, eds., *Norm Dynamics in Multilateral Arms Control* (Athens, GA: University of Georgia Press (2014), 1.