The Verification and National Implementation of International Instruments for Nuclear Non-Proliferation and Security

Hassan Elbahtimy

Postdoctoral researcher at the Centre for Science and Security Studies (CSSS) in the War Studies Department, King's College, London. His research interests include the role international organisations play in the nuclear field, arms control verification and WMD politics in the Middle East.

Holds a PhD from the War Studies Department in 2013 for a thesis that addressed the historical origins of Egypt's nuclear policy. He holds the United Nations Disarmament Fellowship (2006).

Sonia Drobysz

Legal Officer for the National Implementation Measures Programme at the Verification Research, Training and Information Centre (VERTIC), London, working on the national implementation of international instruments related to nuclear security, UN Security Council Resolution 1540 and the Biological Weapons Convention.

Holds a PhD in international law from University Paris I Panthéon Sorbonne and a university diploma in international nuclear law from University Montpellier 1/OECD Nuclear Energy Agency.

Abstract

Collective international efforts to address and mitigate the risk of nuclear misuse have resulted in an expanding body of instruments that can be called the global nuclear regime. This article examines the role played by some of the major international instruments in the nuclear field particularly the Treaty on the Non-Proliferation of Nuclear Weapons and UN Security Council Resolution 1540 in addressing nuclear proliferation and security. In particular, it introduces and explains the concepts of verification and national implementation as important components of nuclear control regimes and addresses the role they play in ensuring that states are abiding by their international obligations. Specifically, the article examines some of the verification mechanisms and national implementation measures developed for these instruments, and discusses how they operate.

Resumo

A Verificação e a Implementação Nacional de Instrumentos Internacionais de Não-Proliferação Nuclear e *Security*

Os esforços conjuntos internacionais para lidar e mitigar o risco de má utilização nuclear resultaram numa expansão do número de instrumentos que são apelidados de regime nuclear global. Este artigo examina o papel assumido por alguns dos principais instrumentos internacionais na área nuclear, em particular o Tratado de Não-Proliferação Nuclear e a Resolução nº1540 do Conselho de Segurança das Nações Unidas na gestão da proliferação e segurança nuclear. Concretamente, introduz e explica os conceitos de verificação e implementação nacional como importantes componentes dos regimes de controlo nuclear e aborda o papel que estes têm para garantir que os Estados cumprem as suas obrigações internacionais. Examinam-se ainda alguns dos mecanismos de verificação e medidas de implementação nacional desenvolvidas por estes instrumentos e a forma como operam.

Introduction

Efforts to control the destructive potential of nuclear technology started shortly after the scientific and technical breakthroughs that highlighted the benefits but also risks associated with the use of nuclear energy. Collective international efforts to address and mitigate the risk of nuclear misuse have resulted in an expanding body of instruments that can be called the global nuclear regime. This constitutes a wide array of instruments including treaties, protocols, UN resolutions, formal and informal arrangements and codes of conduct that are both growing in number and sophistication. The ultimate purpose of these instruments is to impose some order on the risks associated with the use of nuclear energy. Two issues in particular gained prominence internationally: nuclear proliferation and nuclear security.

Horizontal nuclear proliferation refers to the spread of nuclear weapons to new countries resulting in an increase in the total number of states in possession of these weapons. This has been identified as an international problem very early on in the nuclear age and various international efforts have been directed at addressing it (Goldblat, 2002: 148). The Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which entered into force in 1970, is widely considered as the most prominent international non-proliferation instrument.

However, it predominantly addresses states while, to a large extent, ignoring the role of non-state actors in nuclear proliferation. Public revelations of clandestine nuclear supply networks did much to focus the attention on the problem. In 2004, the Security Council therefore acted to plug this perceived gap. It adopted resolution 1540 which addresses the threat caused by the illegal access, trafficking and proliferation by non-states actors of nuclear, biological and chemical (NBC) weapons, as well as their means of delivery and related materials.

Nuclear security "focuses on the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities" (IAEA, 2013: para. 1.1).[1] Such malicious acts could involve attempts by a terrorist group to make a nuclear explosive device with nuclear material, or an improvised radiological dispersal device with a radioactive source, thereby contributing to the proliferation of such weapons. Other acts which nuclear security measures aim to combat, include theft, sabotage, illicit trafficking or illegal transfer of nuclear or other radioactive material. The adoption of UN Security Council Resolution 1540 (UNSCR 1540) can be considered as an important breakthrough moment in how the international community address the challenges of keeping nuclear materials and facilities

1 "Associated activities" are "the possession, production, processing, use, storage, handling, disposal or transport of nuclear material or other radioactive material" (IAEA, 2013: 11).

secure.[2] Other instruments addressing various aspects of nuclear security are also relevant for the objectives of the resolution.[3]

This article examines the role played by some of the major international instruments in the nuclear field particularly the NPT and UNSCR 1540 in addressing nuclear proliferation and security. In particular, it introduces and explains the concepts of verification and national implementation as important components of nuclear control regimes and addresses the role they play in ensuring that states are abiding by their international obligations. Specifically, the article examines some of the verification mechanisms and national implementation measures developed by these instruments, and discusses how they operate.

Verification of International Instruments

What is Verification and What Role Does it Play?

Verification can be defined in a general way as the establishment of truth or correctness by examination or demonstration. Mechanisms of verification have been developed in many fields and they are used in different varieties in auditing, academic peer-reviews, courts and many other activities where evidence collection is systematically pursued to reach an independent judgement about something that is presented as a fact.

2 It should be noted that UNSCR 1540 focuses on nuclear weapons which utilize nuclear material but does not explicitly address the proliferation of radiological dispersal devices which utilize radioactive material. Nuclear security, however, aims to prevent, detect and respond to acts directed not only at nuclear but also other radioactive material.

3 The 1980 Convention on the Physical Protection of Nuclear Material and the IAEA Code of Conduct on the Safety and Security of Radioactive Sources are explicitly mentioned in the preamble of UNSCR 1540. Other relevant instruments include the 2005 International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), the 2010 Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation, the 1988 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation as amended by the Protocol of 2005 to the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, and the 1988 Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf as amended by the Protocol of 2005 to the Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf. For a detailed presentation of the relevant instruments for nuclear security, see for instance IAEA (2011). "*The International Legal Framework for Nuclear Security*". *Nuclear Law Series No.4*. Vienna: IAEA; C. Stoiber (2010). *Nuclear Security: Legal Aspects of Physical Protection, Combating Illicit Trafficking and Nuclear Terrorism*. In Nuclear Energy Agency, ed. 2010. Author?? *International Nuclear Law: History, Evolution and Outlook, 10th Anniversary of the International School of Nuclear Law*. Paris: OECD Publications, pp. 219-242.

Verification has, over time, become a common practice in international affairs and developed into one of the main issues in the field of arms control and non-proliferation. Whether during negotiations, drafting or implementation, verification occupies a prominent place in all stages of arms control (Gallagher, 1997:138-140). The reason behind the growing salience of verification in arms control and non-proliferation is not hard to imagine.

The end of the Cold War resulted in a considerable expansion of bilateral and multilateral arrangements and agreements that addressed the vast stockpiles of weapons then deemed excessive in Post Cold War order (Nye, 1989: 51-55). However, because states consider armaments and military capabilities as central to their national security, having access to verification became increasingly important to ensure that no party is cheating and in the process gaining some military advantage over other abiding parties (Meyer, 1984: 111-24). While verification was practiced during the Cold War and may even have much older roots in earlier arms control practices, it was the fast expansion of arms control in the 90s and disappearance of Soviet objections to on-site inspections that opened the door wide open to significant expansion in international verification activities. (Dunn *et al*, 1990: 198)

A group of governmental experts convened by the UN defined arms control verification as the 'process in which data are collected, collated and analysed in order to make an informed judgment as to whether a party is complying with its obligations.' (UN, 1995: 15) For verification to be credible, it requires an impartial and objective assessment of available evidence through a rigorous process to reach a final judgement. Traditionally verification has been done either by common arrangements between parties to an agreement or delegated to an international organisation like the International Atomic Energy Agency (IAEA) or the Organisation for the Prohibition of Chemical Weapons (OPCW). In all cases, the underlying assumption is that whatever a country declares should not be taken at face value but should be subjected to examination.

In this context verification serves three main functions. It provides tools to detect non-compliance of states with their obligations (UNIDIR, 2003: 2-3). Effective verification regimes emphasise the importance of accurate and timely detection to limit any advantages that can be accrued from cheating. In addition to detection, verification also has a deterrence function. If cheating will be detected and announced, states might choose to hold to their obligations. In addition to the above, verification allows states to demonstrate their compliance in an open, official and systematic way which can build confidence in the value of cooperation between states.

Verifying Non-Proliferation: the Case of the Nuclear Non-Proliferation Treaty

The nuclear non-proliferation treaty is one of the most widely adhered to international treaties and for many years has become a central component of the international

nuclear order. The treaty entered into force in 1970 after a long process of negotiations in the previous decade and is widely acknowledged to rely on three pillars: nuclear non-proliferation, nuclear disarmament and peaceful nuclear cooperation (Dhanapala, 2010: 6)

To verify the non-proliferation obligations of the Treaty, Article III requires non-nuclear weapons states to apply nuclear safeguards. To that end, and over the years, a sophisticated system for verification has developed to address the non-proliferation obligations under the treaty.

The IAEA was entrusted as an independent international organisation to verify the non-proliferation under the NPT. The IAEA was established in 1957, long before the NPT entered into force, and already had a limited system of safeguards that was developed in the context of the rise of interest in nuclear technology and trade in the 50s (Fischer, 1997: 243). The NPT significantly expanded this system and introduced the concept of 'Comprehensive Safeguards'. They were called 'comprehensive' because of the break they made with earlier safeguards applied by the Agency and that were restricted to certain facilities, items or materials.

States under comprehensive safeguards undertake to establish an internal system to account for and control nuclear material and designate a national authority for this purpose. For the purpose of safeguards, such material includes enriched uranium, plutonium and uranium-233 all of which can be used as fissile materials for nuclear explosive devices (IAEA, 2007: 8). Internal accounting measures also cover natural and depleted uranium. Using the information collected by their internal systems of accountancy, states then provide the IAEA with periodic reports on their nuclear holdings and according to a defined schedule.

It is the task of the IAEA then to check the information provided in state declarations to look for discrepancies and inconsistencies. The IAEA also routinely sends inspectors, according to specified procedures, to examine nuclear material balances and that nuclear facilities are of the design declared and reported by the state and operate accordingly. State declarations and IAEA inspections form the core of nuclear non-proliferation verification activities.

Over the years, new instruments were added to the safeguards tool box to enhance the effectiveness and the efficiency of safeguards. In 1974, a protocol was conceived to reduce the verification burden for states with limited nuclear infrastructure which was amended in 2005 and called 'Small Quantities Protocol.' In 1997, the IAEA introduced the 'Additional Protocol' which provided the IAEA with additional legal authority to enhance its verification activities through increased reporting and enhanced access for agency inspections (Hirsch, 2004: 140).

A process of examination and evaluation of state reports and inspection outcomes follows and ends with the IAEA drawing conclusions on the state of nuclear activities in each country and depending on which safeguards instruments a state has in

place. Strong assurances are provided for states with both comprehensive safeguards agreement and an additional protocol in force. When no discrepancy or inconsistency is discovered by the IAEA, it reports that no nuclear material was diverted to military purposes and the absence of undeclared material. For countries with only a comprehensive safeguards agreement (CSA) in force, the agency provides more limited assurances that cover only non-diversion of declared materials (IAEA, 2011: 11).

IAEA safeguards are considered one of the most important international verification regimes in practice but it is one that is not without its challenges. The early nineties was a time when some shortcoming of the regime became clear. Despite IAEA safeguards, Iraq and North Korea's nuclear weapons programmes went largely undetected (Rockwood, 2002: 125-126). This was one of the reasons why the Agency developed enhanced verification tools including the Additional Protocol. Currently, differences about Iran's nuclear capabilities continue to highlight the sensitivity and challenges that face effective implementation of safeguards.

Furthermore, some of the safeguards tools remain underutilized due to political sensitivities or convenience. CSAs gives the IAEA the right to invoke 'special inspections' when there are grounds to suspect prohibited activities are taking place in undeclared locations. Over almost four decades, this tool has only been invoked twice (Acton *et al*, 2009)

Further development and evolution of safeguards seems to continuously bring into light the tension between the sovereignty of nation-states and the need for greater access and transparency that are needed for effective verification. Controversies surrounding how open source information can be used by IAEA in its verification activities and differences over introducing state level approaches to safeguards are clear examples of these tensions. Yet despite the challenges and differences, IAEA safeguards continue to play a major and important role in bringing up, addressing and managing compliance to the non-proliferation obligations under the NPT.

Monitoring Implementation of Nuclear Security Obligations: the Case of UNSCR 1540

Resolution 1540 was significant in many ways. The resolution's adoption under Chapter VII permits the Security Council to use its enforcement powers to give effect to its decisions in the resolution. Moreover, by requiring states to enact certain domestic legislation, the resolution has used the legislative rather than the more commonly-used executive function of the Council (Buffer *et al*, 2008: 71) However, how can states, the UN Security Council or the international community ensure that obligations brought about by the resolution are being carried out by all states?

In absence of a dedicated international body that can take up this task, resolution 1540 established a special committee called the 1540 Committee. Operative paragraph four of the resolution identifies as the main task of the Committee its duty to report to the Council on the state of implementation of the resolution. This provides for a mechanism to monitor the state of implementation of the resolution and provides the Council with the tools through which it can later determine compliance (Crail, 2006: 360). The Committee includes all members of the UN Security Council and is assisted in its work by the UN Secretariat and a group of international experts.

The Committee's initial mandate was for two years reflecting a predisposition for a short-term ad-hoc monitoring mechanism. However, through subsequent resolutions the mandate of the Committee was extended until 2021 and its role in supporting and assisting implementation became increasingly prominent.

The resolution asks all states to submit national reports to the Committee about their implementation of the resolution. To harmonise these reports, the Committee produced a set of reporting guidelines. National reports are later collected, collated and analysed by the Committee (UN, 2006: 8).

For its internal purposes the Committee produced a matrix which operationalises the various obligations under the resolution into distinct practical activities (Allen *et al*, 2007: 7) The Committee then uses information contained in national implementation reports in addition to publicly available information to identify what steps were taken by each country and where the gaps might still exist. (UN, 2006: 8) In some cases, the Committee would ask a state to clarify or update the information it provided in its national report making the process of data collection and assessment interactive.

General conclusions derived from these activities are later reported to the Security Council for consideration. The Committee submitted reports that addressed monitoring of implementation to the Security in 2006, 2008 and 2011. Since 2011 the Committee provides annual reports to the Council on the state of implementation of the resolution.

While the Committee plays an important role in monitoring implementation and providing assistance to states, some can argue that its role falls short of traditional verification as for example practiced by the IAEA and other organisations. The Committee assesses and reports on information it receives from states in their national reports but so far has nothing like the intrusive inspection mechanisms available for other regimes and which enable a thorough implementation assessment.

National Implementation of International Instruments[4]

What is National Implementation and Why is it Important?

National implementation follows a "self-evident" principle according to which "a state which has contracted valid international obligations is bound to make in its legislation such modifications as may be necessary to ensure the fulfilment of the obligations undertaken" (PCIJ, 1925: 20). It may consist in adopting more than a general constitutional clause making relevant international legal obligations directly applicable in national law: the instruments for non-proliferation and nuclear security require the adoption of detailed provisions and "are only enforceable at the national level if they are effectively implemented through laws and regulations" (Spence, 2012: 97).

While national implementation is an obligation, there are also considerable benefits to be gained from it. With appropriate legislation in place, in line with international requirements, states can investigate, prosecute and punish any offences involving nuclear and radiological weapons, as well as their related material. That may in itself serve as a deterrent against such acts. Also, with appropriate laws and regulations, states can exercise proper control over nuclear and other radioactive material and radioactive sources, including their production, storage, use, transport, import and export. By putting legislative measures in place, national security and public health and safety will thus be enhanced.

National Implementation of the Nuclear Non-Proliferation Treaty

The implementation of the NPT and related safeguards obligations encompass three main types of measures: *prohibitions*, *implementation of safeguards agreements* (in particular a system of accounting for and control of nuclear material) and *export and import controls.*

Articles I and II of the treaty prohibit a number of activities which states undertake not to commit. They could additionally decide to criminalize those activities in their national laws. For nuclear-weapon states, those include the transfer to any recipient of nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and assisting, encouraging, or inducing any non-nuclear-weapon state to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices. Non-nuclear-weapon states should prohibit the

4 Parts of this section are a condensed version of the following article: S. Drobysz (2014). "A New Legal Tool for States: the National Legislation Implementation Kit on Nuclear Security" in Mariano Manóvil (ed.), *Nuclear Law in Progress: Derecho Nuclear en Evolucion, XXI AIDN/INLA Congress – Buenos Aires 2014*. Buenos Aires: Legis Argentina, pp. 569-592.

receipt of nuclear weapons or other nuclear explosive devices as well as the receipt of control over such weapons or devices directly, or indirectly; the manufacture of nuclear weapons or other nuclear explosive devices; and the seeking or receipt of any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

The application of safeguards obligations, as provided for in Article III.1 of the NPT, comprehensive safeguards agreements and additional protocols, requires the adoption of a legislative and regulatory system "providing for oversight and management of nuclear material and activities" (IAEA, 2012: 9) and enabling the IAEA's verification activities. The national legal framework should clarify what safeguards apply to, by defining "nuclear material" in line with the CSA. Further, it should provide for the following elements: creation of a national authority responsible for the proper application of the safeguards agreement, a system to account for and control nuclear material, licensing requirements for the use, handling, transfer and other activities involving nuclear material, obligations of the licensees with respect to safeguards implementation such as the maintenance of records, performance of measurements of nuclear material, submission of reports. Additionally, arrangements for supporting and facilitating verification activities conducted by the IAEA should be provided for.[5]

Finally, Article III.2 of the treaty forbids states parties to provide to any non-nuclear-weapon state source or special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material for peaceful purposes, unless the source or special fissionable material is subject to the safeguards. Comprehensive safeguards agreements and additional protocols also require states to report certain exports and imports. The national legal framework should therefore comprise specific export and import legislation, including appropriate lists of material, equipment and technology subject to export and import controls, as well as provisions for the licensing of exports and imports.

National Implementation of UNSCR 1540 and other Nuclear Security Instruments

The measures to be adopted by states under UNSCR 1540 and other nuclear security instruments can be presented under two main pillars: on the one hand,

5 On the national implementation measures for safeguards, see IAEA (2012). *Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols.* Service Series No. 21. Vienna: IAEA, p. 9; VERTIC (2013). *National Implementation Measures for the 1968 Nuclear Non-Proliferation Treaty (NPT).* VERTIC Fact Sheet 5; C. Stoiber *et al* (2003). *Handbook on Nuclear Law*. Vienna: IAEA; C. Stoiber *et al.* (2010). *Handbook on Nuclear Law, Implementing Legislation.* Vienna: IAEA, Chapter 12.

prohibitions and criminalization of acts related to the proliferation of nuclear weapons to non-state actors, the illicit trafficking of nuclear and other radioactive material and nuclear terrorism as well appropriate criminal proceedings for those offences, and on the other hand, measures for the *prevention* of the commission of such acts.

But first, key terms such as "non-state actors", "nuclear material", "radioactive material", "radioactive sources", "nuclear facility" should be defined in the national legal framework, as they determine the scope of application of the national implementation measures. The definitions must be in line with what the resolution and conventions provide for.

Penal measures should then be adopted too. Operative paragraph 2 of UNSCR 1540 requires all states, in accordance with their national procedures, to "adopt and enforce appropriate effective laws which prohibit any non-state actor to manufacture, acquire, possess, develop, transport, transfer or use nuclear (…) weapons and their means of delivery, in particular for terrorist purposes, as well as attempts to engage in any of the foregoing activities, participate in them as an accomplice, assist or finance them". Other international instruments for nuclear security additionally provide for specific offences and adequate penalties.[6] The national criminal procedure should enable the effective investigation and prosecution of the offences, and provide for specific international cooperation measures.

Another set of national implementation measures aims to prevent the commission of prohibited activities, under the terms of operative paragraph 3 of UNSCR 1540, that requires the establishment of *domestic controls* to prevent the proliferation of nuclear weapons and their means of delivery, including by establishing appropriate controls over related materials. Such domestic controls encompass measures similar to those adopted for the implementation of the NPT and safeguards agreements. They start with the national regulation of activities involving nuclear material, other radioactive material and radioactive sources. That includes the establishment of a competent authority responsible for the regulation of nuclear activities.[7] A licensing system to ensure that no person can carry out activities involving nuclear material, radioactive material or radioactive sources without a license should also be put in place, as well as measures for the verification of compliance with applicable requirements.[8]

6 See for instance the 1980 Convention on the Physical Protection of Nuclear Material and its Amendment (Articles 7(1)), and the International Convention for the Suppression of Acts of Nuclear Terrorism (Articles 2 and 5).

7 As required for instance in Article 2A (2)(b) of the amended CPPNM.

8 See in that sense Article 2A (3), *Fundamental Principle C* of the CPPNM/A; paragraphs 19 (c) and (h), 20(h), 22(i) of the Code of Conduct.

International instruments for nuclear security also require that measures be adopted to account for and protect nuclear (see UNSCR 1540, operative paragraph 3 (a) and (b)) and other radioactive material. Regarding nuclear material, Article 2A (1) of the amended Convention on the Physical Protection of Nuclear Material provides that each state party shall "establish, implement and maintain an appropriate physical protection regime applicable to nuclear material and nuclear facilities under its jurisdiction". Article 8 of the International Convention on the Suppression for Acts of Nuclear Terrorism contains a similar obligation regarding radioactive material, providing that "for purposes of preventing offences under this Convention, states parties shall make every effort to adopt appropriate measures to ensure the protection of radioactive material, taking into account relevant recommendations and functions of the International Atomic Energy Agency."

Finally, the export, import, transit, trans-shipment of nuclear and other radioactive material should be regulated, as required for instance by operative paragraph 3 (d) of UNSCR 1540 and Article 4 of the CPPNM.

Process and Challenges of National Implementation

A number of measures thus need to be adopted in the national legal framework to give full effect to the international instruments for nuclear non-proliferation and security. Doing so nevertheless requires significant efforts and can prove very challenging even for the most capable national governments.

The complexity of the international legal framework itself complicates the task. Contrary to other fields of international law, nuclear non-proliferation and security are not governed by one single convention but by multiple instruments. States will therefore have to put considerable effort into identifying relevant instruments and obligations and consolidating them. Moreover, the complex framework can generate "issues of consistent interpretation and effective implementation by national authorities and international organisations" (Stoiber, 2010: 240).

National circumstances must also be taken into account. There is not a "one size fits all" process to follow to adopt the wide range of national implementation measures discussed above. States may decide to adopt a single standalone and comprehensive nuclear law, multiple nuclear-related laws, or follow a diffused approach leaving implementation across various laws and regulations including penal codes, laws on export-import, laws on the transport of dangerous goods, laws on health, etc.

A "diffused" approach to national implementation, however, may add to the problem of harmonization, by increasing the risk of inconsistency, repetition and "confusing cross-referencing of provisions in different laws" (Stoiber, 2012: 12).

Additionally, as nuclear legislation concerns a number of different legal and technical areas, many actors are usually involved in the drafting process and they do not necessarily have the same level of understanding of the issues at stake; coordination of their participation can be difficult to organize (Stoiber, 2012: 13). Other obstacles to national implementation, identified by the IAEA with regard to the CPPNM Amendment, include the possible "deficiency in the legal and technical expertise and financial resources needed, particularly, for the full and effective implementation of the Amendment, such as legislative drafting" (Johnson, 2014: 552). The Agency also noted, "although many CPPNM States Parties support the Amendment in principle, a need to deal with other more pressing priorities was highlighted" (Johnson, 2014: 552). The same holds true for other instruments for non-proliferation and security.

Conclusion: Strengthening Verification and Implementation

International instruments play an important role in controlling sensitive and dual-use technologies to ensure that these technologies are only dedicated to peaceful uses. They create global frameworks through which common threats and risks can be mitigated and addressed. The NPT and UNSCR 1540, discussed in this article, are prominent examples of how these instruments have evolved into sophisticated and complex international regimes. They create legally binding commitments for the non-proliferation of nuclear weapons and the prevention, detection and response to criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities.

Yet, the ability of these instruments to achieve their full promise depends in large part on the development of effective verification and implementation measures that translate international norms and commitments into accountable actions. The development of effective and impartial international verification capabilities that are regularly updated to incorporate the latest in verification technologies is vital to ensure that cases of non-compliance are detected in a timely and accurate manner or even deterred before they occur. New notions of state sovereignty should accommodate increasing intrusiveness of international verification. It is also the responsibility of the international community to insist on high standards of verification that emphasize objectivity, professionalism and lack of political bias. More efforts also need to be directed to compliance-determining and enforcement mechanisms to ensure that verification conclusions are acted upon in a swift and unequivocal way to enhance the credibility of these international instruments.

Full and effective implementation of instruments for non-proliferation and nuclear security is a long-term task.[9] States face different challenges when implementing international obligations. Their efforts can be hampered by the complex and evolving nature of the international legal framework itself. The lack of adequate resources and the existence of other pressing national priorities may also be obstacles to effective implementation. Relevant international, regional and sub-regional organizations as well as non-governmental organizations have a crucial role to play in helping to address such obstacles. They provide assistance services but have also developed many tools, including model laws, to help implement international instruments related to nuclear non-proliferation and security[10], and their use should be encouraged. Building reliable international verification capabilities and addressing national implementation gaps are both essential components for any effective international framework for nuclear non-proliferation and security.

References

Acton, J.; Fitzpatrick, M., and Goldschmidt, P. (2009). "The IAEA Should Call for a Special Inspection in Syria". *Carnegie Endowment for International Peace*. Available at http://carnegieendowment.org/2009/02/26/iaea-should-call-for-special-inspection-in-syria.

Balci, Y. (2014). "UNSCR 1540: The State of Implementation," Statement to Chatham House event on *UNSCR 1540 Ten Years On: Challenges and Opportunities*. London, 5 November 2014. Available at http://www.vertic.org/media/assets/Presentations/UNSCR1540_Statement_5nov14.pdf.

Buffard, I. and Hafner, G. (2008). *International Law between Universalism and Fragmentation*. Leiden: Brill.

9 This was highlighted by the 1540 Committee in its *Report of the Committee established pursuant to Security Council resolution 1540 (2004)*, UN Security Council document S/2011/579, para. 134. For a brief and recent overview of the status of implementation of UNSCR 1540, see Y. Balci (2014). "UNSCR 1540: The State of Implementation", Statement to Chatham House event on *UNSCR 1540 Ten Years On: Challenges and Opportunities*. London, United Kingdom, 5 November 2014. Available at http://www.vertic.org/media/assets/Presentations/UNSCR1540_Statement_5nov14.pdf.

10 See for instance VERTIC-Indonesia (2014). *National Legislation Implementation Kit on Nuclear Security*. Available at http://www.vertic.org/pages/homepage/programmes/national-implementation-measures/nuclear-and-other-radioactive-material/legislation-drafting-tools.php; VERTIC (2014). *Legislative Guide to National Implementation of UN Security Council Resolution 1540 (2004)*. Available at http://www.vertic.org/pages/homepage/programmes/national-implementation-measures/un-security-council-resolution-1540/legislation-drafting-tools.php; UNODC (2014). *Transport-related (civil aviation and maritime) Terrorism Offences, Counter-Terrorism Legal Training Curriculum*. New York: United Nations; UNODC (2009). *Model Legislative Provisions against Terrorism.* Available at http://www.unodc.org/unodc/fr/legal-tools/model-treaties-and-laws.html; C. Stoiber *et al.* (2010). *Handbook on Nuclear Law, Implementing Legislation.* Vienna: IAEA.

Crail, P. (2006). "Implementing UN Security Council Resolution 1540: A Risk-Based Approach". *Nonproliferation Review* Nº2.

Dhanapala, J. (2010). *Evaluating the 2010 NPT Review Conference*. US Institute of Peace.

Dunn, L.; Dunn G. and Gordon A. (1990). *Arms Control Verification and the New Role of on-Site Inspection*. Lanham: Lexington Books.

Oxford Public International Law (1925). *Exchange of Greek and Turkish Populations (Advisory Opinion) (1925)*. PCIJ (series B) Nº. 10.

Fischer, D. (1997). *History of the International Atomic Energy Agency: The First Forty Years*. Vienna: IAEA.

Gallagher, N. (1997). "The Politics of Verification: Why 'How Much?' Is Not Enough". *Contemporary Security Policy* Nº2.

Goldblat, J. (2002). *Arms Control: The New Guide to Negotiations and Agreements*. London: Sage Publications.

Hirsch, T. (2004). "The IAEA Additional Protocol: What It Is and Why It Matters". *The Nonproliferation Review* Nº3.

IAEA (2007). "IAEA Safeguards: Staying Ahead of the Game". Vienna: IAEA.

IAEA (2011). "IAEA Safeguards and Additional Protocols: Verifying Compliance with Nuclear Non-Proliferation Undertakings'. Vienna: IAEA.

IAEA (2011). *The International Legal Framework for Nuclear Security*. Nuclear Law Series No.4. Vienna: IAEA.

IAEA (2012). *Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols.* Service Series No. 21. Vienna: IAEA.

IAEA (2013). *Objective and Essential Elements of a State's Nuclear Security Regime*. Nuclear Security Series No. 20. Vienna: IAEA.

Johnson, P. L. (2014). "Facilitating the Entry into Force and Implementation of the Amendment to the Convention on the Physical Protection of Nuclear Material: observations, challenges and benefits" in Mariano Manóvil, R. (ed.), *Nuclear Law in Progress: Derecho Nuclear en Evolucion, XXI AIDN/INLA Congress – Buenos Aires 2014.* Buenos Aires: Legis Argentina.

Meyer, S. (1984). "Verification and Risk in Arms Control". *International Security* Nº4.

Nye, J. (1989). "Arms Control after the Cold War". *Foreign Affairs* Nº5.

Potter, W. (2010). "The NPT & the Sources of Nuclear Restraint". *Daedalus* Nº1.

Rockwood, L. (2002). "The IAEA's Strengthened Safeguards System". *Journal of Conflict and Security Law* Nº1.

Spence, S. (2012). "Legal Aspects of the Control and Repression of Illicit Trafficking of Nuclear and Other Radioactive Materials: is there a Need for an International Convention?" *Nuclear Law Bulletin* Nº1.

Stoiber, C. (2010). "Nuclear Security: Legal Aspects of Physical Protection, Combating Illicit Trafficking and Nuclear Terrorism" in Nuclear Energy Agency (ed.), *International Nuclear Law: History, Evolution and Outlook, 10th Anniversary of the International School of Nuclear Law*. Paris: OECD Publications.

Stoiber, C.; Baer, A.; Pelzer, N.; and Tonhauser, N. (2003). *Handbook on Nuclear Law*. Vienna: IAEA.

Stoiber, C.; Baer, A.; Pelzer, N.; and Tonhauser, N. (2010). *Handbook on Nuclear Law: Implementing Legislation*. Vienna: IAEA.

Stoiber, C. (2012). "Developing National Legislation for Nuclear Security: Priority Issues and Basic Approaches". *1540 Compass* Nº2.

UNIDIR (2003). *Coming to Terms with Security: a Lexicon for Arms Control, Disarmament and Confidence-Building*. Geneva: UNIDIR.

UNODC (2009). *Model Legislative Provisions against Terrorism.* Available at http://www.unodc.org/unodc/fr/legal-tools/model-treaties-and-laws.html.

UNODC (2014). *Transport-related (civil aviation and maritime) Terrorism Offences, Counter-Terrorism Legal Training Curriculum*. New York: United Nations

United Nations (2006). "Report of the Committee established pursuant to resolution 1540", S/2006/257

United Nations (1995). 'Verification in all its aspects: including the role of the United Nations in the field of verification.' UN Doc A/50/377.

VERTIC (2013). National Implementation Measures for the 1968 Nuclear Non-Proliferation Treaty (NPT). VERTIC Fact Sheet Nº5

VERTIC (2014). *Legislative Guide to National Implementation of UN Security Council Resolution 1540 (2004)*. Available at http://www.vertic.org/pages/homepage/programmes/national-implementation-measures/un-security-council-resolution-1540/legislation-drafting-tools.php.

VERTIC-Indonesia (2014). *National Legislation Implementation Kit on Nuclear Security*. Available at http://www.vertic.org/pages/homepage/programmes/national-implementation-measures/nuclear-and-other-radioactive-material/legislation-drafting-tools.php.

Weiner, A.; Braun C.; May, M.; and Speed, R. (2007). "Enhancing Implementation of UN Security Council Resolution 1540". Stanford: Center for International Security and Cooperation Stanford University.