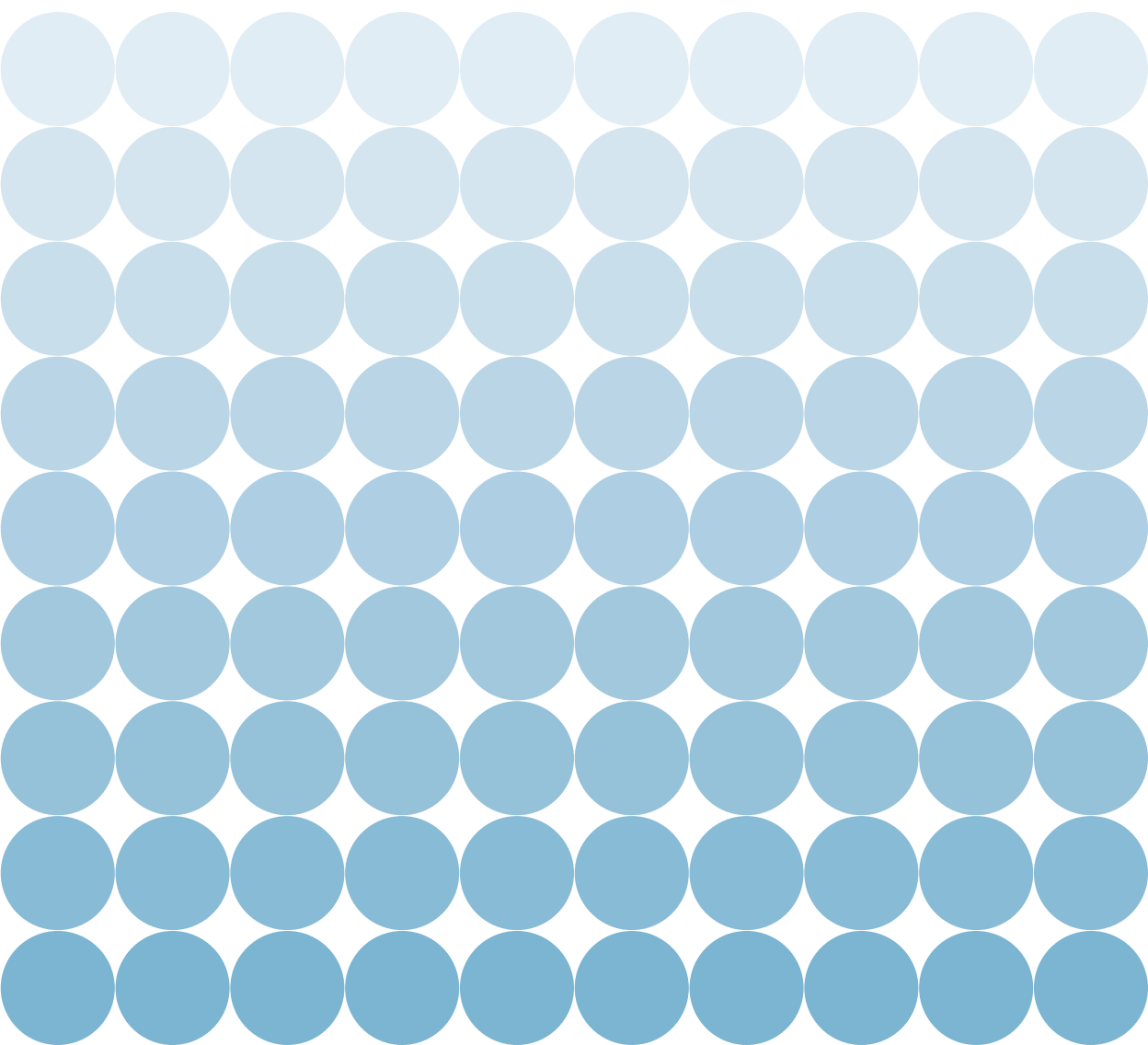


# THE FUTURE OF THE CHEMICAL WEAPONS CONVENTION

Policy and Planning Aspects

MOHAMED DAOUDI, JOHN HART,  
AJEY LELE AND RALF TRAPP



## **STOCKHOLM INTERNATIONAL PEACE RESEARCH INSTITUTE**

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SIPRI Policy Paper no. 35

MOHAMED DAOUDI, JOHN HART,  
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**STOCKHOLM INTERNATIONAL  
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# Preface

Although the deadline for the final destruction of chemical weapons (CW) under the 1993 Chemical Weapons Convention (CWC) passed in April 2012, nearly a quarter of declared stocks of CW agents remain to be destroyed. The recent revelations of undeclared stocks in Libya and reports of stockpiles in Syria (a non-party to the CWC) show that CW destruction must remain a focus for the convention's implementing body, the Organisation for the Prohibition of Chemical Weapons (OPCW). However, the complete destruction of stockpiled chemical weapons is within sight. As progress is made towards this goal, new challenges are emerging in the field of CW arms control and non-proliferation: adapting to developments in science and technology, maintaining a capacity to prevent and respond to chemical weapon use, and preventing use of toxic chemicals by non-state groups.

This is of particular relevance for the OPCW and for the states parties as they gather for the Third CWC Review Conference in April 2013. The conference is an opportunity for the parties to take decisions and agree principles and guidelines that will determine the focus of activities of the OPCW for the years to come. It is therefore important to have a clear understanding of the principles, drivers and trends of the field of chemical weapons as the Conference is about to commence.

This Policy Paper provides useful and timely insights for all interested stakeholders of the CWC. Its authors—whose expertise encompasses industry, academia, the military and the OPCW—offer a useful mix of chemical arms control analysis and the requirements of policy formulation and implementation. The options for decisions and activities that they offer will help the CWC regime find an appropriate balance among many competing technical and capacity requirements inherent to the regime and the parties' expectations.

Thanks are due to those who assisted, supported or otherwise facilitated this project, including Dr Christer Ahlström of the Swedish Agency for Non-Proliferation and Export Controls (ISP), Jan Lodding of the Swedish Ministry for Foreign Affairs, Dr Ian Anthony and Jakob Hallgren of SIPRI, the external referee, and Dr David Cruickshank of the SIPRI Editorial and Publications Department for editing this publication. Particular thanks are due to the authors for their work on this insightful publication, and especially John Hart for initiating and coordinating this project. Finally, the authors and I are grateful to the Swedish Ministry for Foreign Affairs for its generous support, guidance and expertise. Of course, the views expressed are those of the authors and do not necessarily reflect those of the funder or their respective employers.

Finally, SIPRI looks forward to continue to engage with our partners in and beyond the Review Conference in the analysis of the control and non-proliferation of chemical weapons for the benefit of us all.

Professor Tilman Brück  
Director, SIPRI  
April 2013

## Summary

Since the 1993 Chemical Weapons Convention (CWC) entered into force in 1997, its primary focus has been on destruction of chemical weapon (CW) stockpiles and associated infrastructure. More than three-quarters of declared CW agents and nearly half of declared CW munitions and containers have now been destroyed. Work thus remains to complete the destruction of all CW stocks. Notwithstanding the centrality of CW disarmament to the CWC regime, full and effective implementation of the convention also entails a wide variety of other activities including non-proliferation, assistance and protection, international cooperation, effective national implementation of the CWC's provisions, and bringing the few remaining states that are not party to the treaty—such as Israel, North Korea, Myanmar and Syria—fully into the regime.

As the states parties gather for the Third CWC Review Conference in April 2013, there are a number of proposals for strategic approaches and directions that they could consider in their assessment of the operation of the convention, both at the Review Conference and subsequently. In particular, they could formulate a constructive 'vision' of the treaty regime according to agreed principles of the core objectives of the CWC and in terms of its operational, legal and political relevance to the broader international security and chemical safety context. This broader context—directly or indirectly—also shapes the policy and operational requirements of efforts to ensure that toxic chemicals are not employed in armed conflict and by non-state actors. Such efforts should also serve to promote and uphold an ideal standard of globally accepted legal practice.

As has been frequently observed, the CWC was finalized as the cold war ended. At that time, traditional arms control and disarmament regimes paid little attention to operational difficulties, as this was generally considered to be an internal matter for the state. However, for at least the past decade, new instruments, measures and treaty regimes have been increasingly discussed in terms of counterterrorism, effective and universal national implementation of international legal requirements, and non-proliferation. This has been accompanied by the rise and spread of new instruments for the control and prevention of prohibited weapons and of oversight mechanisms for the relevant dual-purpose technologies, materials and equipment (e.g. the Proliferation Security Initiative and United Nations Security Council Resolution 1540).

The convention's implementing body, the Organisation for the Prohibition of Chemical Weapons (OPCW) must maintain its ability to respond to the risks posed by advances in science and technology and ensure that the convention's verification concepts and procedures are not undermined or rendered irrelevant by such advances. The amount of data that it has to review is vast. Therefore, organizing principles and methodologies are required to permit the OPCW to evaluate this data in the context of the CWC. In addition, CWC-relevant concepts such as 'deterrence' and 'effective verification' are partly informed by the modalities of how information is acquired and used for verification purposes, and the

identification and weighting of risk factors specific to a given type of facility, and frequency of inspection algorithms (by facility and country). The parties sometimes consider science and technology developments on their own terms (e.g. as has been done by the OPCW's Scientific Advisory Board). Finally, they may focus on key main trends (or drivers). In the chemical industry such drivers include further diffusion of knowledge and technology as part of shifts in demand and supply patterns, technology innovation, and continued efforts to improve the safety of chemicals production, storage and transport.

Another important component of the CWC regime relates to preparedness and response to toxic chemical threats. The OPCW should shift from an ad hoc approach in its international collaboration on preparedness and response to a systematic and sustainable approach that includes identifying and maintaining contact with key partners such as the UN Office for the Coordination of Humanitarian Affairs (OCHA), the UN Office for Disarmament Affairs (UNODA) and the World Health Organization (WHO). Preparedness and response are not merely administrative, legal or government-driven topics. Rather, they involve other stakeholders and include building a security culture across the chemical field, including in industry, research and academia. A new opportunity that the OPCW could exploit after the Third Review Conference is cooperation and contact with the regional Chemical, Biological, Radiological and Nuclear (CBRN) Centres of Excellence that are soon to be set up with seed funding from the European Union.

The Third Review Conference has the potential to open avenues for consultation among the parties on selected topics with external input. Simultaneously, the conference should avoid taking decisions that may preclude adjustments and changes in direction. Such hindering actions (or other unfortunate effects) can be caused by the decision-taking process itself. It can also occur by implication if such decisions adversely affect the capabilities of the Technical Secretariat. The CWC requires continued political and technical support and engagement to ensure its future international security relevance.



# Abbreviations

BTWC	Biological and Toxin Weapons Convention
CBRN	Chemical, biological, radiological and nuclear
COE	Centre of Excellence
CSP	Conference of the States Parties
CW	Chemical weapons
CWC	Chemical Weapons Convention
DOC	Discrete organic chemical
DOC/PSF	Discrete organic chemical containing phosphorus, sulphur or fluorine
EDNA	Electronic Declaration Tool for National Authorities
EU	European Union
GMO	Genetically modified organism
IFS	Instrument for Stability
IUPAC	International Union for Pure and Applied Chemistry
MOU	Memorandum of Understanding
OCHA	Office for the Coordination of Humanitarian Affairs
OCPF	Other chemical production facility
OEWG	Open-Ended Working Group
OPCW	Organisation for the Prohibition of Chemical Weapons
SAB	Scientific Advisory Board
SME	Small- and medium-sized enterprise
TS	Technical Secretariat
UN	United Nations
UNODA	United Nations Office for Disarmament Affairs
VIS	Verification Information System
WMD	Weapons of mass destruction



# 1. Introduction

As one of the means by which states seek to mitigate threats to their national security, the 1993 Chemical Weapons Convention (CWC) forms a key aspect of the broader international peace and security context.<sup>1</sup> During the first 15 years of its operation, its main contribution to international peace and security was the elimination of most of the large chemical weapon (CW) stockpiles amassed during the cold war.<sup>2</sup> Although elimination of CW has yet to be completed, the emphasis of the CWC regime is gradually shifting from finalizing CW disarmament to preventing states rearming with CW and preventing criminals and terrorist groups using toxic chemicals.<sup>3</sup> The broader context in which the CWC is implemented is continually changing and the convention's relevance—both actual and perceived—under these conditions needs to be maintained.

The CWC regime must remain engaged with all relevant actors related to its mandate and must strengthen its institutional capacity and memory. The ways in which the parties envision the future balance and focus of the regime's activities should be highlighted, at least informally, at the Third CWC Review Conference in April 2013 and subsequently. Future approaches could include (a) the status quo, defined by the continuation of current implementation practice and the progressive reduction of resources devoted to CW destruction and related verification tasks; (b) the transformation of the CWC regime into an international assistance regime with specialized technical expertise that can be used to support risk assessment, preparedness and response to a variety of chemical threats, including chemical warfare; and (c) a balanced approach spread across selected core objectives. Such approaches may also be partly based on the medium-term planning documentation of the Organisation for the Prohibition of Chemical Weapons (OPCW), which in turn structures CWC implementation activity around seven core objectives—chemical demilitarization, non-proliferation, assistance and protection, international cooperation, universality, national implementation, and organizational effectiveness—and observes that chemical

<sup>1</sup> Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (Chemical Weapons Convention, CWC), opened for signature 13 Jan. 1993, entered into force 29 Apr. 1997, United Nations Treaty Collection, <[http://treaties.un.org/Pages/CTC\\_Treaties.aspx?id=26](http://treaties.un.org/Pages/CTC_Treaties.aspx?id=26)>.

<sup>2</sup> As of 23 Jan. 2013, 55 540 tonnes (or 78%) of the 71 196 tonnes of CW agent declared by the parties to the CWC had been destroyed, and 3.95 million (or 46%) of the 8.67 million declared munitions and containers had been destroyed. Organisation for the Prohibition of Chemical Weapons (OPCW), 'Demilitarisation: latest facts and figures', <<http://www.opcw.org/our-work/demilitarisation/>>.

<sup>3</sup> United Nations Counter-Terrorism Implementation Task Force (CTITF), *Interagency Coordination in the Event of a Terrorist Attack using Chemical or Biological Weapons or Materials*, Report of the Working Group on Preventing and Responding to Weapons of Mass Destruction Attacks (United Nations: New York, Aug. 2011); and OPCW, Third CWC Review Conference, 'Report of the Scientific Advisory Board on developments in science and technology', RC-3/DG.1, 29 Oct. 2012. OPCW documents are available at <<http://www.opcw.org/documents-reports/>>.

threats consist of more than “traditional” chemical warfare with mass casualties’.<sup>4</sup>

A constructive conceptualization (i.e. visualization) can be done by the reader of the treaty regime according to agreed principles on the core objectives of the CWC and in terms of its operational, legal and political relevance to the broader international safety and security context that (directly or indirectly) concerns the prevention of the misuse of toxic chemicals in armed conflict and by non-state actors.

This Policy Paper presents proposals for strategic approaches and directions that the states parties to the CWC could consider in their assessment of the operation of the convention, both in the context of the Third Review Conference and subsequently. It starts, in chapter 2, by placing the CWC and the Third Review Conference in a broader context of the current and future international security environment. It then examines operational and policy issues related to advances in science and technology (in chapter 3) and in preparedness and response (in chapter 4) in the context of the CWC, with a view to informing the scope and focus of the future decisions and activities of the OPCW. In conclusion, chapter 5 presents possible future adaptations of the CWC regime that would enable it to more effectively operate in the broader international security environment. The study aims to provide a sufficient basis for choosing suitable pathways to maintain the future relevance of the convention according to a range of underlying ‘visions’.

<sup>4</sup> OPCW, Executive Council, 70th Session, ‘Medium-term plan for the period from 2013 to 2015’, EC-70/S/1, 28 June 2012, paras 4–5.

## 2. The changing international context and the Third CWC Review Conference

### **From arms control to non-proliferation**

In terms of the broader arms control and disarmament context, a paradigm shift is occurring away from a largely undisputed United Nations framework—agreed among states—of rights and obligations that reflects the political circumstances of the cold war. The current paradigm embraces a wider variety of actors—including civil society, academia and industry—whose interests and mandates extend beyond prohibiting or controlling a given weapon system.<sup>5</sup> Various factors have prompted this change, including a de facto reduced emphasis by states on disarmament combined with a stronger emphasis on non-proliferation and consequence-management strategies. The change has also been prompted by a psychological shift from the cold war paradigm that viewed arms control in terms of preventing widespread or total destruction emanating from the use of nuclear weapons, and an increased focus on threats from non-state actors such as terrorists.<sup>6</sup>

Traditional arms control and disarmament regimes, such as the CWC, paid little attention to operational difficulties that a participating state might encounter in meeting its obligations, since this was largely considered to be an internal matter for the state.<sup>7</sup> However, for at least the past decade, new instruments, measures and treaty regimes have been increasingly discussed in terms of counterterrorism, effective and universal national implementation of international legal requirements, and non-proliferation. This has been accompanied by the rise and spread of new instruments for the control and prevention of prohibited weapons and of oversight mechanisms for the relevant dual-purpose technologies, materials and equipment (e.g. the Proliferation Security Initiative and UN Security Council Resolution 1540).<sup>8</sup>

The stronger focus on non-state actor threats in the international peace and security context has four significant implications. First, a state's military forces are less directed towards those of other states and are instead increasingly focused on domestic and international non-state opponents or on peacekeeping. Second, the threat of violence (at least in the northern hemisphere) is increasingly evaluated according to a diffuse and broader spectrum of threats that includes sabotage, criminal violence and various phenomena that undermine social structures. Third, while the cold war arms control paradigm assumes a

<sup>5</sup> See eds O. Meier and C. Daase, *Arms Control in the 21st Century: Between Coercion and Cooperation* (Routledge: London, [2012]).

<sup>6</sup> Bailes, A. J. K., 'The changing role of arms control in historical perspective', eds Meier and Daase (note 5), p. 21.

<sup>7</sup> Bailes (note 6), p. 18.

<sup>8</sup> UN Security Council Resolution 1540, 28 Apr. 2004. On the PSI see Dunne, A., *The Proliferation Security Initiative: The Statement of Interdiction Principles, Legal Considerations and Operational Realities*, SIPRI Policy Paper (SIPRI: Stockholm, forthcoming 2013).

Westphalian model of relations between states that control their territory, globalization and other transnational developments tend to undermine or question this paradigm. Fourth, attempts by states to allow for a legitimate and proper control and oversight over equipment, technology and materials that can be misused for weapon purposes present a continuing weakness, especially in the nuclear arms control context (as exemplified by the A. Q. Khan nuclear smuggling network).<sup>9</sup>

Despite the focus on non-state threats and the involvement in conflicts of a more diverse set of actors, armed forces are nevertheless used primarily to engage or destroy the armed forces of another state. Furthermore, military forces are not permitted to operate domestically in many states.<sup>10</sup> To a great extent military forces must still be capable of facing other military forces, including for territorial defence and force-projection purposes. Countering non-state actor threats is an additional task, which shapes military force structure and doctrine.<sup>11</sup>

In addition, there is an increased correlation between proliferation risks and the global diffusion of knowledge (as opposed to hardware, material, equipment and infrastructure). The diffusion is partly a function of the continued decentralization of the production of sensitive items by private, global industry.<sup>12</sup> This correlation poses distinct challenges to the understanding and implementation of arms control regimes.

Such broader concerns, perceptions and tensions will affect the balance and scope of activities carried out under the CWC regime, including in the future when CW stockpiles will have been destroyed. In addition, some parties to the CWC are reluctant for the regime to take on an explicitly non-proliferation aspect. To them, the term 'non-proliferation' partly implies that some states may continue possessing the weapons, while others pledge not to acquire them. This also implies that those who possess the weapons maintain control over the technology concerned. However, the CWC and the 1972 Biological and Toxin Weapons Convention (BTWC) both forbid possession of, respectively, chemical and biological weapons. The dichotomy of 'haves' and 'have-nots' mainly concerns the nuclear arms control context.<sup>13</sup> This is because under the 1968 Non-Proliferation Treaty (NPT) it is unclear when (if ever) the nuclear weapon states

<sup>9</sup> Bailes (note 6), pp. 24–25. See also International Institute for Strategic Studies (IISS), *Nuclear Black Markets: Pakistan, A. Q. Khan and the Rise of Proliferation Networks* (IISS: London, 2007).

<sup>10</sup> E.g. see Seybolt, T. B., SIPRI, *Humanitarian Military Intervention: The Conditions for Success and Failure* (Oxford University Press: Oxford, 2007); and Wiharta, S. et al., *The Effectiveness of Foreign Military Assets in Natural Disaster Response* (SIPRI: Stockholm, 2008).

<sup>11</sup> Hart, J., 'Threat assessment processes and military capacity: structure and purpose in the current international security environment', *Defence Global*, Feb. 2012, pp. 88–89.

<sup>12</sup> Joyner, D. H., 'Restructuring the multilateral export control regime system', ed. D. Joyner, *Non-Proliferation Export Controls: Origins, Challenges, and Proposals for Strengthening* (Ashgate: Aldershot, 2006), pp. 216–17.

<sup>13</sup> Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (Biological and Toxin Weapons Convention, BTWC), opened for signature 10 Apr. 1972, entered into force 26 Mar. 1975, *United Nations Treaty Series*, vol. 1015 (1976).

will disarm.<sup>14</sup> Elements of the discussion on the ‘haves’ and the ‘have-nots’ in the nuclear arms control context are nevertheless evident in some chemical and biological arms control regime policy circles. This concern about a non-proliferation approach is reflected by the recent increased use of the term ‘re-emergence’ by some CWC states parties (e.g. at the 17th Conference of the States Parties in November 2012). Nevertheless, the term ‘non-proliferation’ is commonly used by the OPCW, including in its current medium-term planning documentation.<sup>15</sup>

The shift of emphasis from a CW disarmament agenda to more of a development agenda or a cooperation and assistance agenda means the OPCW will increasingly interact with a broader set of actors with varying organizational mandates and interests. It remains to be seen how such actors will interact and how the resulting relationships will be maintained.

With respect to operational activity and the mandates of various international actors relevant to the prevention of the misuse of toxic chemicals and the response to their use should prevention fail, the UN Working Group on Preventing and Responding to Weapons of Mass Destruction Attacks has observed that ‘no one [UN or international] agency can claim overall responsibility for either chemical or biological terrorism preparedness and response’.<sup>16</sup> Engaging the various relevant actors in a meaningful manner entails developing and strengthening existing relationships and creating new ones (e.g. through joint meetings and shared operational protocols) and identifying and implementing operationally relevant activity such as joint training and exercises. On the chemical safety and security side, Jan van der Kolk and Ravi Agarwal have identified various difficulties and operational objectives, including the need to better understand the exposure of vulnerable societal groups to toxic chemicals; the drivers, mechanisms, costs and benefits entailed in the replacement of more hazardous chemicals with less hazardous chemicals; and the linkages between political preferences and the technical requirements of sound management of chemicals.<sup>17</sup>

### **The current and future international security scene**

A number of current and future international peace and security threat perceptions are relevant to the CWC. The convention, which was formulated before the terrorist attacks on the United States of 11 September 2001, faces limitations related to terrorist violence. The negotiators of the CWC decided to exclude terrorism-related issues from the international measures to be taken under the

<sup>14</sup> Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT), opened for signature 1 July 1968, entered into force 5 Mar. 1970, <<http://www.iaea.org/Publications/Documents/Treaties/npt.html>>.

<sup>15</sup> OPCW (note 4).

<sup>16</sup> The Working Group is part of the UN Counter-Terrorism Implementation Task Force (CTITF), established to support the 2005 UN Global Counter-Terrorism Strategy. United Nations Counter-Terrorism Implementation Task Force (note 3), p. vii; and UN General Assembly Resolution 60/288, ‘The United Nations Global Counter-Terrorism Strategy’, 8 Sep. 2006.

<sup>17</sup> Van der Kolk, J. and Agarwal, R., ‘Future outlook and challenges’, eds P. Wexler et al., *Chemicals, Environment, Health: A Global Management Perspective* (CRC Press: Boca Raton, FL, 2012), pp. 761–69.

convention (particularly with respect to its verification).<sup>18</sup> These threats were meant to be addressed through national implementation requirements (Article VII of the convention). The reasoning behind this approach largely also applies today, with the possible notable exception of how Article X (on ‘Assistance and protection against chemical weapons’) can be applied in cases of terrorist threats that involve the use or threatened use of toxic chemicals.<sup>19</sup> Nevertheless, the legal implications of the use of industrial toxic chemicals by a non-state group in a conflict location remain unclear from a CWC perspective, including in terms of how the convention’s general purpose criterion can be operationalized.<sup>20</sup>

The views of the Non-Aligned Movement (NAM) and China in the CWC context continue to stress two things: first, the importance of the cooperation and capacity-building nature of the regime and, second, the need to ensure that any state party’s obligations in respect of how to undertake measures to address terrorist CW threats derive from the convention’s provisions, rather than being imposed on the CWC regime by other international frameworks or requirements.<sup>21</sup> Simply put, this characterization is an implicit criticism of strategic trade controls whereby all states are ‘to take and enforce effective measures to establish domestic controls to prevent’ proliferation of nuclear, biological and chemical weapons and their means of delivery ‘including by establishing appropriate controls over related materials’.<sup>22</sup> All states in good standing under the legal responsibilities of their multilateral arms control and disarmament obligations should, in other words, be treated equally.

Given the advent of new technologies and structural changes in the chemical industry, an inherent potential for misuse exists. Globally, the chemical industry is witnessing rapid growth, changing market conditions, and pressures emanating from such factors as resource scarcities, environmental requirements (both in terms of environmental rules and business opportunities to address environmental degradation concerns), globalization trends, shifts in consumer patterns,

<sup>18</sup> See e.g. de Wijk, R. and Sweijts, T., ‘The threat of terrorist organizations acquiring chemical weapons: the role of the OPCW’, ed. Ralf Trapp, *Academic Forum, The Hague, 18 & 19 September 2007, Conference Proceedings* (Netherlands Institute of International Relations Clingendael: The Hague, 2008).

<sup>19</sup> See e.g. OPCW, Conference of the States Parties, 17th Session, Statement on behalf of the Non-Aligned Movement and China, C-17/NAT.23, 26 Nov. 2012, para. 11. This statement can be understood as a partial delinking of CWC implementation from other international efforts to prevent chemical terrorism, including perhaps UN Security Council resolutions 1373 and 1540.

<sup>20</sup> The CWC embodies a so-called general purpose criterion whereby all toxic chemicals and their precursors are prohibited ‘except where intended for purposes not prohibited’ and ‘as long as the types and quantities are consistent with such purposes’. CWC (note 1), Article II, para. 1. The general purpose criterion—which is referred to in some national implementing legislation—is the principal means by which the CWC’s prohibition against chemical warfare is made comprehensive in scope and by which future changes in science and technology are taken into account.

<sup>21</sup> To varying degrees NAM statements emphasize the importance that national transfer controls not impede the full implementation of Article XI of the CWC. The NAM has also generally sought to keep counterterrorism coordination activity separate from the CWC. E.g. OPCW, Executive Council, 71st Session, Statement on behalf of the Non-Aligned Movement and China, EC-71/NAT.8, 19 Feb. 2013, paras 6, 10.

<sup>22</sup> UN Security Council Resolution 1540 (note 8), para. 3.



demographics and the impact of regulations (e.g. the REACH Regulation of the European Union, EU).<sup>23</sup>

Key strategic drivers that will shape the evolution of the chemical industry in the coming decades include the following.

1. *Globalization*. This is characterized by emerging industry leaders from Asia and the Middle East, strengthening economic ties between regions and an increasingly global supply chain in specialty chemicals. Chemical manufacturing is spreading from traditional production locations in Japan, the USA and Western Europe to locations in Asia, Eastern Europe, Latin America and the Middle East.<sup>24</sup>

2. *Growth*. This is characterized by a shift of supply and demand patterns favouring the Middle East and Asia, commoditization of specialty chemicals, further pressures to reduce prices, and the re-emerging importance of technology and innovation.

3. *'Green growth'*. This is characterized by a search for alternative feedstocks, efforts to limit carbon emissions in order to slow or stop global warming, and the spread of environmental factors in the taking of business and political decisions across the West. Government policies and regulations often aim to influence consumer behaviour, while business often argues for a 'level' international regulatory playing field. Such factors prompt somewhat more philosophical debates regarding the extent to which the international market place actually allows for a reasonable, transparent and equitable competition based on enterprises' respective focus of operation and abilities.<sup>25</sup>

In this rapidly evolving environment, questions can be raised about the adequacy of the various safety precautions and internal compliance mechanisms taken by the industry, particularly small-scale industry in developing states. These concerns apply to countries with an evolving chemical industry that lack institutional capacity or experience to regulate this evolving industry. They also apply to the implementation of CWC requirements by small- and medium-sized enterprises (SMEs) that may lack capacity to comply with all national regulations and laws governing their activities. SMEs exhibit implementation difficulties in all parts of the world, including in Western states. This typically relates to certain

<sup>23</sup> Management Centre Europe, 'Global shifts in the chemical industry', <<http://www.mce-ama.com/industry-expertise/chemicals>>. See also Charles River Associates (CRA), *Chemical Industry 2020: The Future is Upon Us* (CRA International: Boston, MA, [n.d.]). On the Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) see European Commission, Environment Directorate-General, 'REACH', <[http://ec.europa.eu/environment/chemicals/reach/reach\\_intro.htm](http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm)>. India is developing similar legislation. Indian Ministry of Chemicals and Fertilizers, Department of Chemicals and Petrochemicals, *Draft National Chemical Policy (Draft NCP-2012)* (Department of Chemicals and Petrochemicals: New Delhi, 2012), p. 16.

<sup>24</sup> Management Centre Europe, 'Developing your people to deal with global changes in the chemical industry', *Executive Issue: Chemical Industry*, no. 38 (2012); and Asia-Pacific Economic Cooperation (APEC), 'Chemical dialogue', <<http://www.apec.org/Groups/Committee-on-Trade-and-Investment/Chemical-Dialogue.aspx>>.

<sup>25</sup> Charles River Associates (note 23).

technical aspects of the implementation of the provisions of the CWC in areas such as the provision of timely and accurate declarations and the proper support of inspections. However, these technical difficulties should not be confused with the inability of the verification system to detect deliberate breaches of the convention. The former is undesirable, while the latter is critical.

In addition, recent discoveries have blurred the distinctions between chemical and biological production processes, at least in certain fields (e.g. the manufacturing of biofuels based on renewable resources, the development of new types of platform chemicals, and the synthesis of certain pharmaceuticals and pesticides).<sup>26</sup> These factors pose questions regarding the verification of the non-production of CW by the chemical industry. Such factors may also increase the number of options that could become available to terrorist organizations and make their use easier. In cases of unregulated industrial growth, the number of industrial accidents and incidents of sabotage that occur could also increase.

Trends in process technology used by the chemical industry also require attention. Smaller facilities that are able to flexibly switch between the manufacture of different kinds of chemical pose a potential challenge to CWC verification. The OPCW conducts inspections of declared chemical production facilities that do not produce chemicals listed on the CWC's Annex on Chemicals. This is an area of chemical industry verification that is likely to receive further attention and focus.

The OPCW conducts industry inspections, in part, so that they may act as a deterrent. Industry inspections need to cover concerns related to the potential for the production of CW (both traditional CW and novel agents). To an extent, industry inspections also help to address the potential for diversion by non-state actors (e.g. terrorists and criminals) of existing toxic chemicals.<sup>27</sup> However, it should also be noted that a company is also a non-state actor. It is therefore important to emphasize that national implementation is the basis for national control measures. National implementation also serves as the mechanism for declaring chemical industry plants and opening them to inspection.

The possible improvised production of CW agents by non-state actors could be a matter more for domestic law enforcement than for international verification and inspection. International verification, in contrast, creates transparency among states and other international actors. It also acts as a deterrent in cases where companies may participate (knowingly or not) as part of clandestine state programmes or, conceivably, as fronts for terrorists.

The importance and attractiveness of the CWC regime in the current international, regional and national security contexts focus on several areas (including arms control and disarmament) that are useful and effective instruments to restrict and control the spread of weapons of mass destruction (WMD).

<sup>26</sup> Jacoby, M., 'Teaming up for biobased chemicals', *Chemical & Engineering News*, vol. 90, no. 32 (6 Aug. 2012), pp. 37–38.

<sup>27</sup> On this concern see OPCW, RC-3/DG.1 (note 3), para. 56. On cruder alternatives see Garrett, B. C. and Hart, J., *Historical Dictionary of Nuclear, Biological, and Chemical Warfare* (Scarecrow Press: Lanham, MD, 2007), pp. 142–43.

The non-discriminatory nature of the CWC is its greatest virtue. But as the CW stockpiles dating from the cold war era are being eliminated, the convention finds itself coping with structural challenges to maintain relevance in the evolving security environment. This is partly a consequence of increased terrorist threats (and threat perceptions), as well as of the implications emanating from changes in science and technology.

### **CWC regime developments and preparations for the Third Review Conference**

At the time of the First Review Conference, in 2003, many of the operationally relevant implementation matters identified by the 1993–97 OPCW Preparatory Commission remained unresolved. To a significant degree, this has changed. One major focus of activity for the CWC regime following the Second Review Conference, in 2008, was an attempt to achieve universal membership and to establish and implement criteria for effective national implementation of all of the CWC's main provisions. This included ensuring that all of the parties established their national authorities and that they informed the OPCW's Technical Secretariat (TS) about the authorities and the legislative and administrative measures put in place to implement the convention.

In the run-up to the Third CWC Review Conference, a number of general observations have been made regarding where contentious issues may arise and preferred outcomes of the conference.<sup>28</sup> For example, participants at a 2012 Wilton Park conference emphasized the importance of stakeholder buy-in and broad participation in the preparation of the Review Conference, the need to agree soon on the desired format of the outcome document, and the desirability of engaging in a strategic exercise to provide longer-term guidance rather than in routine (even if 'augmented') decision making.<sup>29</sup>

The central issue of non-compliance with the CWC's deadline for the completion of the destruction of all declared chemical weapons was addressed by a decision of the 16th Conference of the States Parties (CSP) in 2011.<sup>30</sup> While the Third Review Conference will clearly devote attention to how this decision is being implemented, the failure of some possessor states parties to meet the convention's final destruction deadline will not be its principal focus. Instead, other issues will receive greater attention than before. Themes that might attract such attention include (a) opportunities in the area of international cooperation, (b) universalization of the convention, (c) assistance and protection against chemical weapons (including the OPCW's contribution to enhancing the preparedness and response capacities of the states parties), (d) how to ensure full

<sup>28</sup> The occurrence of 'show stoppers' (e.g. dramatic developments in Syria) cannot be excluded.

<sup>29</sup> Wilton Park, 'The Chemical Weapons Convention: Third Review Conference and beyond', Conference report, 15–17 Oct. 2012, <<https://www.wiltonpark.org.uk/conference/wp1178/>>.

<sup>30</sup> OPCW, Conference of the States Parties, 16th Session, 'Final extended deadline of 29 April 2012', Decision, C-16/DEC.11, 1 Dec. 2011.

national implementation by all the parties, (e) the OPCW's contribution in chemical safety and security, and (f) the future of the convention's verification system.

A number of general observations regarding preferred outcomes for the Third Review Conference have been made by states parties in the context of the Open-Ended Working Group (OEWG) for the Preparation of the Third Review Conference. For example, some parties believe that the final text and decisions of the conference must support effective and sustained implementation of Article XI (on 'Economic and technological development'). Others emphasize the need to improve implementation of Article VI (on 'Activities not prohibited') or to strengthen the CWC's verification system, including through better focusing industry verification and by maintaining institutional readiness to carry out a challenge inspection or investigation of alleged CW use.

The following subsections highlight some of the issues that the Third CWC Review Conference is likely to address—specifically, advances in science and technology; the final destruction of chemical weapons and subsequent steps; the equal rights and obligations of the parties; and national implementation—and identify some likely outcomes in these areas.

#### *Advances in science and technology*

In addition to considering the operational aspects of the CWC, the Review Conference has the mandate to review advances in science and technology, and to assess how they affect the operation of the convention and whether implementation processes need to be adapted as a consequence. This review will also have to consider how these challenges affect the TS structurally and in terms of knowledge management (preservation of institutional memory and training) in general and recruitment in particular (including the 7-year tenure policy for TS staff).<sup>31</sup> Areas of activity ('pillars' or core areas of focus) and how they could be structured in the context of advances in science and technology have already been considered in relation to the 2011 report of the Advisory Panel on Future Priorities of the OPCW (known as the Ekéus Report after the panel's chair, Rolf Ekéus), the findings of the 2012 OPCW Scientific Advisory Board (SAB) report, and a report by the International Union for Pure and Applied Chemistry (IUPAC).<sup>32</sup>

The scope for agreement on the proposed use of incapacitants for law-enforcement purposes is limited. However, there may be scope to initiate a consultation process on this matter within the OPCW. The OPCW's Director-General, Ahmet Üzümcü, has stated that the TS 'will pursue efforts to enhance its chemical-

<sup>31</sup> See OPCW, Conference of the States Parties, 4th Session, 'OPCW staff regulations', Decision, C-IV/DEC.25, 2 July 1999, regulation 4.4; and OPCW, Conference of the States Parties, 2nd Special Session, 'Tenure policy of the OPCW', Decision, C-SS-2/DEC.1, 30 Apr. 2003.

<sup>32</sup> OPCW, Technical Secretariat, 'Report of the advisory panel on future priorities of the Organisation for the Prohibition of Chemical Weapons' ('Ekéus report'), Note by the Director-General, S/951/2011, 25 July 2011; and OPCW, RC-3/DG.1 (note 3); and Smallwood, K. et al., 'Impact of scientific developments on the Chemical Weapons Convention (IUPAC technical report)', *Pure and Applied Chemistry*, vol. 85, no. 4 (2013). A draft of the IUPAC report was submitted to the OPCW in late 2012 to help inform its preparations for the 3rd Review Conference.

analysis capabilities' and 'will work with [OPCW] designated laboratories' on verification of the potential use of toxic chemicals for law-enforcement purposes. He also suggested that the parties 'might consider using' the Third Review Conference 'as an opportunity to further discuss the broader implications of the use of toxic chemicals for law-enforcement purposes'.<sup>33</sup>

How the Review Conference addresses the implications of developments in science and technology for the operation of the convention could both facilitate verification or make some verification tasks more difficult. Developments in science and technology can also affect the balance between offensive and defensive applications of chemical science in war and thus the 'utility' of chemical warfare in relation to other forms of military force. They can also create opportunities to further peaceful international cooperation between the parties in the chemical field—recognizing the important role that chemical science and technology play for sustainable development.

The implications of advances in science and technology for the CWC regime are examined in more detail in chapter 3.

#### *The final destruction of chemical weapon stockpiles and subsequent steps*

In 2012 Malaysia reiterated regret for the fact that declared stockpiles of CW had not been completely destroyed.<sup>34</sup> Other states parties repeated this regret during the 17th CSP in November. Also in 2012 India stated that: 'The dilemma facing the [OPCW Executive] Council and the [OPCW] is therefore to ensure the timely destruction of the remaining chemical weapons stockpiles while making preparations for the transition period.'<sup>35</sup>

Some parties are probably unwilling to discuss the post-CW destruction phase of the CWC regime until after the stockpiles have been completely destroyed. To discuss the next phase now would risk reducing the regime's imperative or sense of urgency to achieve a fundamental purpose. In the context of discussions and consultations contributing to the 2011 Ekéus Report, some parties expressed the view that, while CW stockpiles remain, it is premature to speak of transition and new balances when focusing on future activity.<sup>36</sup>

Simultaneously it should be understood that the convention does not prescribe a sequence (i.e. disarmament first, other implementation tasks subsequently). Rather, it builds on the recognition that disarmament must be complemented by other implementation tasks in order for the regime to be effective. National implementation by all of the parties (as required under their individual national

<sup>33</sup> OPCW, Third CWC Review Conference, 'Response by the Director-General to the report of the Scientific Advisory Board on developments in science and technology', Note by the Director-General, RC-3/DG.2, 31 Jan. 2013, paras 15–16.

<sup>34</sup> OPCW, Executive Council, 70th Session, 'Malaysia: statement by H. E. Dr Fauzia Mohamad Taib, permanent representative of Malaysia', EC-70/NAT.8, 25 Sep. 2012, para. 3. See also note 2.

<sup>35</sup> OPCW, Executive Council, 70th Session, 'India: statement by H.E. Ambassador Bhaswati Mukherjee, permanent representative of India', EC-70/NAT.15, 25 Sep. 2012, para. 1.

<sup>36</sup> Two of the authors participated in a meeting on the future of the OPCW regime hosted by Clingendael, the Netherlands Institute of International Relations, on 7 Feb. 2011 where this point was strongly emphasized by several delegations. The meeting was convened to help facilitate the work of the Ekéus advisory panel.

circumstances), verification of the non-production of chemical weapons, measures to ensure compliance and resolve non-compliance concerns, and measures in the areas of assistance, protection and international cooperation are all meant to complement CW disarmament so as to create a comprehensive web of prohibition and prevention.<sup>37</sup> This underlying difference in philosophical approach will influence efforts during and after the Third Review Conference to formulate language that takes this dichotomy (i.e. whether there is a distinct ‘post-disarmament’ phase) into proper account.

In terms of practical organizational work, if the transition issues are not taken up in good time and reflected in OPCW operational planning, a protracted reduction of verification demands in the CW destruction field could lead to a reduction of capacity and expertise that could compromise the ability of the TS to perform other key responsibilities, including in other areas of verification and in the field of assistance and protection.

### *National implementation*

Shortcomings in full and effective national implementation will be another theme evident in coming months and years. Fewer than half of the parties to the CWC have provided information to the OPCW to show that they are fully implementing all key provisions of Article VII (on ‘National implementation measures’) necessary for full national implementation. Malaysia has asked what the implication is when only 47 per cent of the parties have fully complied with their Article VII obligations. According to Malaysia,

It implies that “anything goes” for the rest of the States Parties that have no laws to regulate the requirements of the Convention. Chemical industries can mushroom without any kind of restrictions, chemical products can come in and out of the country freely, and what is most fearful—chemical weapons can be produced in the said country without the slightest knowledge of the authorities.<sup>38</sup>

According to a 2012 TS report, ‘since the Second Review Conference, progress in the status of the establishment or designation of National Authorities and the adoption of legislative and administrative measures by States Parties has been steady’.<sup>39</sup> While it is encouraging that 99 per cent of parties (i.e. all but two) have established or designated a national authority, this does not necessarily translate into full implementation of the convention. To achieve progress in this broader area, a national authority needs to have both the legal authority and the capacity to implement the CWC and to enforce its provisions. The Review Conference could consider whether further confidence could be built if the TS and states

<sup>37</sup> E.g. Rappert, B. and McLeish, C. (eds), *A Web of Prevention: Biological Weapons, Life Sciences and the Governance of Research* (Earthscan: London, 2007).

<sup>38</sup> OPCW, EC-70/NAT.8 (note 34), para. 4. See also OPCW, Executive Council, 70th Session, ‘Status of implementation of Article VII of the Chemical Weapons Convention as at 27 July 2012: Article VII(1)(a) to (c) and other obligations’, EC-70/DG.3, 28 Aug. 2012, table 1.

<sup>39</sup> OPCW, Working Group for the Preparation of the Third Review Conference, ‘Review of the operation of the Chemical Weapons Convention since the Second Review Conference’, Note by the Technical Secretariat, WGRC-3/S/1, 5 Oct. 2012, para. 3.251.

parties were to undertake more efforts with regard to Article VII(5) submissions (on 'legislative and administrative measures taken') and in ensuring that more states parties adopt legislation covering all key areas.<sup>40</sup> As of July 2012, 75 per cent of states parties had reported under Article VII(5) and only 47 per cent had legislation covering all key areas. Indeed, since the data on implementation is self-reported, the reality is probably worse. The Review Conference could consider peer review among the parties and exchange of practical experience. The associated capacity building would complement that required for the implementation of UN Security Council Resolution 1540 and the various requirements in the field of management of chemicals (e.g. under the Strategic Approach to International Chemicals Management, SAICM).<sup>41</sup>

In the framework of the CWC, non-state actor threats will have to be largely dealt with through efforts to achieve full and effective national implementation of the provisions of the CWC and through capacity-building efforts, including with respect to the exchange of technical expertise in the fields of preparedness and response.

#### *The equal rights and obligations of the parties*

The equality of the rights and obligations of all the parties and the avoidance of casting aspersions on the conduct of parties that may be said to be in good standing as regards their convention obligations (or cannot be clearly said not to be) are important principles of the CWC regime. Clarifications of compliance concerns must therefore be sensitive to these principles. The parties must be aware of the risks to the principles of taking the 'path of least resistance' to reach politically preferred outcomes or of cross-linkage of CWC issues with those not related to the convention with the intention of blocking decision making. Nevertheless, allegations persist of CW use and the continuation of certain CW-related activities, including stockpiling and development. These concerns were underscored by the revelation in 2011 that Libya did not fully declare its CW holdings when it joined the convention in 2004.<sup>42</sup> The completeness of other CW declarations has been publicly questioned.<sup>43</sup> However, no formal clarification process has been undertaken by the OPCW (either by the Executive Council or the CSP) to resolve these non-compliance allegations. Questions have also been raised about possible novel types of chemical weapon (e.g. novichok nerve agents, incapacitants and large-calibre munitions for dissemination of riot control agent).<sup>44</sup>

<sup>40</sup> OPCW, EC-70/DG.3 (note 38), table 1.

<sup>41</sup> The SAICM is 'a policy framework to foster the sound management of chemicals', which was adopted by the International Conference on Chemicals Management (ICCM) on 6 Feb. 2006. See <<http://www.saicm.org/>>.

<sup>42</sup> Libya formally amended its declaration on 9 Feb. 2012. OPCW, Conference of States Parties, 17th Session, 'Libya: annual report on progress achieved towards completion of the destruction of the remaining stockpile of chemical weapons', C-17/NAT.2, 1 Nov. 2012, para. 3.

<sup>43</sup> E.g. OPCW, Conference of the States Parties, 5th Session, 'United States of America: statement on the status of implementation of the convention', C-V/NAT.2, 18 May 2000.

<sup>44</sup> E.g. OPCW, RC-3/DG.1 (note 3), paras 56, 82.



The OPCW needs to further consider and develop strategies to respond to such broader concern, for example by clarifying the applicability of the CWC's provisions and the actions of relevant actors required to bring those responsible verifiably into compliance with the convention. One example where the OPCW has provided this clarity is the 'interface procedures' signed in November 2012 by the OPCW and the UN Office for the Coordination of Humanitarian Affairs (OCHA). Among other things, these procedures cover the coordination of assistance activities during the response to an emergency involving the use or threat of use of toxic chemicals as a method of warfare.<sup>45</sup>

Similarly, in 2012 the OPCW and the UN Office for Disarmament Affairs (UNODA) concluded 'interface procedures' on cooperation in cases of investigations of alleged CW use (by both parties and non-parties to the CWC).<sup>46</sup> Although it is established OPCW practice that memoranda of understanding (MOUs) entered into by the TS with secretariats of other international organizations do not require the authorization by the Executive Council, at least one delegation has expressed the view that the Director-General is not authorized to take action under an MOU until the Executive Council has discussed the matter.<sup>47</sup> Such an interpretation undermines the longer-term relevance (perceived and actual) of the convention and is inconsistent with the relevant CWC provisions. In this case, the agreement became caught up in the tensions surrounding the civil war in Syria (a non-party to the CWC). The 16th CSP's decision on non-compliance with the CWC's deadline can perhaps serve as a template for how compliance issues (which may fall under Article VIII or Article IX) can be handled.<sup>48</sup>

A related theme is ensuring that prohibited (including undeclared) CW activity and programmes do not continue in any state party and that any states outside the regime with CW programmes join the convention and verifiably disarm. The TS has recently conducted two reviews of inspection and verification. One is a 3-year programme of 'independent quality review of all types of industry inspections', completed in 2012. This consisted of a review of 21 inspections carried out in 17 states parties and entailed TS staff accompanying inspectors. The purpose was mainly to identify 'trends or patterns that are not easily seen when dealing with inspection and verification activities on a daily basis, and where action is necessary to achieve longer-term benefits'.<sup>49</sup> The TS also undertook efforts to improve the Verification Information System (VIS) for industry inspection

<sup>45</sup> OPCW, 'OPCW signs interface procedures with UN OCHA', Press release, 27 Nov. 2012, <<http://www.opcw.org/news/article/opcw-signs-interface-procedures-with-un-ocha/>>.

<sup>46</sup> OPCW, Executive Council, 70th Session, Report, EC-70/5, 28 Sep. 2012, para. 3.2.

<sup>47</sup> The identity of the delegation or delegations arguing this interpretation is not evident from official OPCW documentation. The USA has, however, publicly rejected this interpretation. OPCW, Executive Council, 70th Session, 'United States of America: U.S. views regarding investigation of alleged use of chemical weapons involving a state not party to the convention', EC-70/NAT.16, 25 Sep. 2012. The UN-OPCW agreement supports the latter view. Agreement Concerning the Relationship between the UN and the OPCW, signed 17 Oct. 2000, <<http://www.opcw.org/about-opcw/un-opcw-relationship/>>, Article XIV.

<sup>48</sup> OPCW, C-16/DEC.11 (note 30).

<sup>49</sup> OPCW, Conference of the States Parties, 17th Session, Opening statement by the Director-General, C-17/DG.16, 26 Nov. 2012, para. 59.



results analysis. This exercise entailed the review of all final inspection reports from industry inspections carried out in 2010 and 2011.<sup>50</sup>

### *Other issues*

Other key issues that could be raised at the Review Conference and after include chemical safety and security and sea-dumped CW.

Chemical safety and security is a rubric for future activity that can involve (a) engaging with other relevant actors to ensure that the prohibition against CW is maintained and strengthened, (b) supporting a wider and deeper programme of operationally relevant international cooperation and assistance activity, and (c) ensuring that the OPCW maintains institutional expertise on appropriate safety and security matters.<sup>51</sup>

The issue of sea-dumped chemical weapons is receiving increased attention. There remain strong legal political and structural limitations to the OPCW's ability to contribute to discussions on sea-dumped CW, let alone undertake actual programme activity. However, OPCW staff and the states parties are continuing to follow developments in this area.<sup>52</sup>

<sup>50</sup> OPCW, C-17/DG.16 (note 49), para. 60.

<sup>51</sup> See e.g. Borkowski, J., Permanent Representative of Poland to the OPCW, 'Development of the OPCW engagement in chemical safety and security—perspective from Poland', Presentation to the International Meeting on Chemical Safety and Security, 8–9 Nov. 2012, Tarnów, <<http://www.opcw.org/imcss/programme-speakers-and-presentations/>>.

<sup>52</sup> E.g. OPCW officials have attended such meetings as those of Chemical Munitions, Search and Assessment (CHEMSEA), <<http://www.chemsea.eu/>>; and 'Minimizing Risks for the Environment in Marine Ammunition Removal in the Baltic and North Sea (MIREMAR)', Neumünster, 16–18 Nov. 2010, <<http://schleswig-holstein.nabu.de/themen/meeresschutz/miremar/>>.

### 3. The impact of advances in science and technology

Advances in science and technology affect the Chemical Weapons Convention in several respects. For example, the knowledge base that could be used to develop and manufacture new types of chemical weapon is expanding rapidly. New technologies used in the chemical industry may challenge established verification procedures and methodologies and require adaptations in the way routine verification is conducted. New technologies may also change the characteristics of a CW plant; for example, they may mean that certain traditional features of a CW production line are absent. Finally, new technologies may affect the ability of inspectors to recognize non-routine industrial activity. All these developments require an ability by the OPCW to conduct authoritative assessments of the risks created by advances in science and technology. Other organizations have developed knowledge base indicators as part of their work that could help to inform such discussions in the CWC context.<sup>53</sup>

Science and technology can also lead to new and improved protections against chemical weapons. These include faster and more selective detection equipment, more robust means of analysis and identification, better prophylaxis and treatments, more effective physical protection, and less aggressive means of decontamination. Defensive and response capabilities may thereby be enhanced.

Broadly speaking, technology advances in the chemical industry are increasingly driven by major market demands including food production, energy production and managing the impact of global warming.<sup>54</sup> Safety-driven changes include efforts to adopt process chemistry that uses lower pressures, and the 'just in time' in-line production and consumption of intermediate chemicals. Other science and technology drivers relate to the desire for environmentally sensitive chemical manufacturing and the demands for alternative, sustainable feedstocks for chemical production. The science and technology associated with each of these activities should be evaluated periodically in terms of their potential contribution to the possible emergence of a technology base that could be misused for CW activity. Such evaluations can draw on the practice of defence and security systems acquisition analyses, economic indices, and related ana-

<sup>53</sup> E.g. the Organisation for Economic Co-operation and Development (OECD) has developed a range of knowledge-based economy indicators, as well as methods to quantify research and development capacity. See also Falk, M., 'What drives business research and development (R&D) intensity across Organisation for Economic Co-operation and Development (OECD) countries?', *Applied Economics*, vol. 38, no. 5 (2006), pp. 533–47.

<sup>54</sup> On the contribution of the chemical industry to energy and greenhouse gas savings see e.g. International Council of Chemical Associations (ICCA), *ICCA Building Technology Roadmap: the Chemical Industry's Contributions to Energy and Greenhouse Gas Savings in Residential and Commercial Construction* (ICCA: Brussels, [2012]). For a selection of relevant reports on global warming see US National Academy of Sciences, Division on Earth and Life Studies, 'Climate change: expert reports', <<http://dels.nas.edu/Climate/Climate-Change/Reports-Academies-Findings>>.

lytical techniques that help to elucidate the nature and direction of science and technology capacity and application.

While it is recognized by many, including the Director-General and SAB, that the increasing convergence between chemistry and biology is of direct relevance to the CWC, it is principally the advances in technology (i.e. the developments in process chemistry and chemical process technology) that would have a measured impact on the CWC verification regime. Advances in the underlying science usually have no immediate bearing on the effectiveness of the industry verification system: activity at larger-scale production facilities matters more than activity at the laboratory or bench level. However, developments in science and technology can affect national implementation requirements with respect to the amounts and types of toxic chemical present and used in different aspects of society, as can related risk-management strategies at the national level.

Advances in science should be expected to affect technology and industrial practice much earlier than in the past. This creates demands for systematic short- and longer-term science monitoring by the states parties and the OPCW Technical Secretariat. In other words, these advances could reduce some of the accumulated confidence in the current OPCW industry verification regime, as well as confidence in the efficacy of national oversight of existing and conventional (i.e. standard) technologies.<sup>55</sup> Consequently, input from the scientific and industrial communities would improve the implementation of the convention and provide additional safeguards for the object and purpose of the CWC (e.g. with respect to scope, focus and level of intensity of verification measures). Such input could include a systematic collection and analysis of industry views of the effectiveness of OPCW verification practice and suggestions for how they could be modified. Such a process should either be coordinated through national authorities or in appropriate forums via trade and professional associations.

### **Biological-mediated processes and other new trends**

It is now well understood that a narrow interpretation of the definition of 'production by synthesis' of discrete organic chemicals (DOCs, including those that may contain phosphorus, sulphur or fluorine, DOC/PSFs) could undermine the strength of the convention's verification system if the term were to be understood to exclude biological or biologically mediated reaction processes.<sup>56</sup> At the same time, although the use of transgenic animals in the production of pharmaceuticals has matured over the past two decades, only two products made in this way have actually been approved in that period: ATryn (an anticoagulant anti-thrombin protein) and Ruconest (a C1 inhibitor used to treat hereditary angio-

<sup>55</sup> No OPCW inspections have occurred in purely biochemical facilities, while few have been carried out in the pharmaceutical industry.

<sup>56</sup> OPCW, RC-3/DG.2 (note 33), para. 4.3. On production by synthesis see CWC (note 1), Verification Annex, Part IX, para. 1.

edema).<sup>57</sup> There may nevertheless be potential for transgenic products given that many 'biologicals' with a high profit margin will soon lose patent protection and transgenic producers may be able to deliver improved products at lower costs.<sup>58</sup>

The purposes of genetically modifying animals are distinct from those for genetically modifying organisms. Many genetically modified organisms (GMOs) are used for pharmaceutical and chemicals production (mainly of simple plant systems or cell systems such as yeasts and microbes). For CWC purposes, perhaps the main question is whether 'production by synthesis' is understood to include biological and biologically mediated processes. Currently, the parties to the CWC do not declare biomediated processes, including those that are potentially declarable from within their chemical industries. Moreover, the SAB has concluded 'provisionally' that, for organophosphorus nerve agents and blister agents listed in the CWC's Schedule 1, 'there is no apparent advantage' in employing biological processes for production.<sup>59</sup>

Since the starter, intermediate and final products of GMO 'production lines' are distinct from those of the traditional chemical industry, verification approaches and concepts must be similarly distinct. If biological processes were to be included in the routine industry verification regime, the states parties should agree on the limits of the verification. For example, they should determine whether plants or animals grown as the feedstock for biological production of certain chemical products are part of a declarable chemical production facility. Given their limited experience with this technology, regulators who attempt to develop guidelines on product safety and quality for drugs produced by transgenic organisms face similar difficult decisions.<sup>60</sup> It may be premature to take firm decisions on the matter in the context of the CWC. This field should nevertheless certainly be monitored to see whether and how industrial-scale chemical manufacturing that employs organisms evolves. Other types of biological process (e.g. the use of genetically modified yeast, bacteria cultures or cell cultures used in the manufacture of chemical products) have been more widely applied. The SAB has concluded that it is the product that is of principal verification concern, rather than the method of production.<sup>61</sup>

Similarly, new trends in chemical production or processing together with developments in process configuration could affect the implementation of the CWC.<sup>62</sup> The likelihood of OPCW inspection teams being confronted with chemical plants that could more easily be converted into Schedule-1 plants is growing. This places greater stress on the OPCW's ability to implement a verification

<sup>57</sup> Thayer, A. M., 'Transgenics firms struggle to keep going', *Chemical & Engineering News*, 3 Sep. 2012, p. 37.

<sup>58</sup> Thayer (note 57).

<sup>59</sup> OPCW, RC-3/DG.1 (note 3), para. 35. The CWC Annex on Chemicals comprises 3 schedules. Schedule 1 lists chemicals and their precursors judged to have few, if any, peaceful applications. Chemicals listed in schedules 2 and 3 have wider peaceful, including commercial, applications.

<sup>60</sup> Thayer (note 57), p. 37.

<sup>61</sup> OPCW, RC-3/DG.1 (note 3).

<sup>62</sup> On current plant design and operation see *Ullmann's Chemical Engineering and Plant Design*, 2 vols (Wiley-VCH & Sons: Weinheim, 2004); and Couper, J. R. et al., *Chemical Process Equipment: Selection and Design*, 3rd edn (Butterworth-Heinemann: Amsterdam, 2012).

system sufficiently robust to assess the capabilities of these plants and to assess the risk that they may pose to the object and purpose of the convention. In this respect, it is also worth noting the SAB's observation that diffusion of technology includes subcontracting or outsourcing of early production steps, including to other states.<sup>63</sup> Such shifts also have implications for verification concepts and approaches (which have usually been facility-, plant- or state-specific). Furthermore, new developments in catalysts (both traditional catalysts and enzymes) can have a variable chemical selectivity in production pathways in which toxic chemicals appear under different (i.e. non-traditional) process conditions.<sup>64</sup>

Technology may either mature in a gradual manner or quickly (i.e. 'disruptively'). In the latter case, a paradigm shift in technology application occurs. The OPCW inspectors may have difficulty recognising equipment associated with technology paradigm shifts and their potential for the production of toxic chemicals. While technology generally matures through gradual improvements and 'fine-tuning', alternative new types of technology can emerge and find niche applications in industry from where they can then spread to wider uses, thereby altering fundamentally the technological landscape. Microreactors can have a configuration that is dedicated (i.e. geared towards a single product or group of related products) or multipurpose (or modular). They typically operate continuously and can be configured to produce significant quantities of toxic chemicals (including Schedule-1 and Schedule-2 chemicals), including carrying out reactions that would otherwise have been hazardous. In its verification procedures, the OPCW may have more difficulty recognizing this equipment than verifying technologies known from the past. Although fast maturation has yet to occur with microreactors, such technology may result in new applications and alternative methods to manufacture well-established, common products.<sup>65</sup>

### **Verification of the chemical industry**

After 15 years of operation and in the light of the number of industry inspections carried out so far at Schedule-1, -2 and -3 facilities and at other chemical production facilities (OCPF's), a solid record that provides confidence has been established for the OPCW verification procedures.<sup>66</sup> In particular, Schedule-1 facilities (i.e. those producing—but not necessarily consuming—small quantities of Schedule-1 chemicals) have been subject to a high frequency of inspection: on average, these facilities are currently inspected every two years.<sup>67</sup> While this inspection intensity correlates with the high risk that the CWC attributes to

<sup>63</sup> Smallwood et al. (note 32), para. 2.3.2.

<sup>64</sup> E.g. Thomas, S. M., DiCosimo, R. and Nagarajan, V., 'Biocatalysis: applications and potentials for the chemical industry', *Trends in Biotechnology*, vol. 20, no. 6 (June 2002), pp. 238–42.

<sup>65</sup> Chohey, N. P., Ondrey, G. and Parkinson, G., 'Microreactors find new niches', *Chemical Engineering*, vol. 104, no. 3 (Mar. 1997), pp. 30–33.

<sup>66</sup> OPCW, Technical Secretariat, 'Report on the performance of the revised methodology for the selection of other chemical production facilities for inspection', Note by the Director-General, S/1070/2013, 14 Feb. 2013.

<sup>67</sup> OPCW, Conference of the States Parties, 16th Session, 'Programme and budget of the OPCW for 2012', Decision, C-16/DEC.12, 2 Dec. 2011, Annex, p. 35.

Schedule-1 chemicals, the facilities themselves often only pose a moderate or small risk to the convention's object and purpose.<sup>68</sup> Consequently, together with the high level of confidence building so far attained during these inspections and the high frequency of inspection, a 'risk category' approach to these Schedule-1 facilities could be recommended. These categories would be elaborated and considered for the purpose of reducing numbers of inspections at facilities that are perceived to pose a higher risk, while monitoring all facilities through a rigorous declaration regime and data monitoring.

The 14th CSP, in 2009, took the last major decision on how to declare mixtures containing low concentrations of Schedule 2 or 3 chemicals.<sup>69</sup> However, it has not been fully implemented. The main issue here is that scheduled chemicals are traded and used in mixtures which, below a certain agreed concentration, are no longer subject to declaration. Moreover, some parties calculate the concentration by weight, while others do so by volume. So long as the states parties use different rules for calculating the data in their declarations or do not declare such mixtures at all, uneven implementation of this aspect of the CWC will continue. Furthermore, reported imports and exports frequently fail to correlate. In September 2012, the TS circulated a second survey to request parties that have not confirmed their implementation of the 2009 decision to inform the TS of the status of its implementation by 31 December 2012.<sup>70</sup> Gradually, national data-calculation methodologies and reporting should become more harmonized, partly through implementation practice.

For facilities producing, processing and consuming Schedule-2 precursors, a risk-assessment methodology has been applied in the past by the TS that is based on a concept adopted by the CSP in 1997 and subsequently simplified to take into account practical experience. Given the considerable number of Schedule-2 facilities inspected to date, this methodology could be revised using knowledge of these facilities, their configuration, capabilities and related factors acquired during inspections. In this case, a 'risk category' approach may be devised, taking into account such aspects as the 'multipurpose' features of some facilities that would pose a higher risk to the object and purpose of the convention. Over time this could lead to a reduction of inspections, while still maintaining a robust declaration and data-monitoring regime.

By June 2012, 356 inspections of Schedule-3 facilities had been carried out.<sup>71</sup> An appropriate frequency of inspection that takes into account the configuration and flexibility of these facilities, as established in previous inspections, in particular for facilities that produce Schedule-3 chemicals, should be maintained.

<sup>68</sup> See note 59. Schedule-3 and DOC/PSF plant sites are not discussed in the CWC in terms of risk factors, while Schedule-1 and -2 facilities are.

<sup>69</sup> OPCW, Conference of the States Parties, 14th Session, 'Guidelines regarding low-concentration limits for declarations of Schedule 2A and 2A\* chemicals', Decision, C-14/DEC.4, 2 Dec. 2009.

<sup>70</sup> OPCW, Technical Secretariat, 'Second survey on the implementation of decision C-14/DEC.4: guidelines regarding low-concentration limits for declarations of Schedule 2A and 2A\* chemicals', S/1040/2012, 18 Sep. 2012, para. 5.

<sup>71</sup> OPCW, WGRC-3/S/1 (note 39), para. 2.11.

The declaration and verification of OCPFs—facilities that produce DOC/PSFs that are not listed in the CWC’s Annex on Chemicals above certain thresholds—is part of the broader chemical industry verification regime.<sup>72</sup> States parties view it as a confidence-building verification regime. The scope of facility information included in declarations is therefore limited, which also limits the value of the data monitoring. In addition, the facilities’ main activities are indicated by product group codes, not a list of chemicals, as is the case for the other regimes. Furthermore, many facilities that are subject to on-site inspection are dedicated plants. The TS has estimated that among the DOC facilities, approximately 10 per cent pose a relatively high risk to the object and purpose of the convention given their technological features (e.g. multipurpose, use of corrosion-resistant equipment etc.) and the chemicals they manufacture (i.e. with chemical processes closely associated with those known from traditional CW programmes, for example, certain pharmaceutical plants and pesticide producers).

By June 2012, the OPCW had inspected fewer than 20 per cent of the approximately 4200 inspectable OCPFs.<sup>73</sup> These facilities have been inspected through a random selection process, taking into account declaration information that might indicate the technological potential of the facility (e.g. the product group code to which the chemical or chemicals belong). The CWC foresees a methodology that takes into account a number of factors, including information available about a facility (i.e. its relevance to the object and purpose of the convention), which are effectively risk based.<sup>74</sup> Such a methodology, however, would require either providing some additional detail on the facilities in the declarations or allowing the TS to use information other than the data contained in the declarations (such as information from previous inspections, open source data from authoritative sources, or data voluntarily provided by states parties on their facilities). States parties might agree a procedure for submitting proposals for selecting plant sites for inspection in accordance with paragraph 11(c) of Part IX of the Verification Annex—which allows the TS to ‘randomly select plant sites for inspection through appropriate mechanisms, such as the use of specially designed computer software’, on the basis of certain weighting factors.<sup>75</sup> However, this is controversial and unlikely to occur any time soon.

Another alternative that could be explored is to extend the exemptions from the declaration requirements under the DOC regime—which are currently applied to facilities that exclusively produce explosives or hydrocarbons—to exempt other types of chemical plant site that exclusively produce certain product types and where the present inspection record clearly shows that these facilities are of little or no relevance to the convention (e.g. urea or methanol plants). This would reduce the number of OCPFs that are liable to receive inspections, make the selection process more focused, and would avoid the selection of

<sup>72</sup> The CWC encompasses all organic chemical production, except explosives and hydrocarbons, in its routine verification regime. CWC (note 1), Verification Annex, Part IX, para. 2.

<sup>73</sup> OPCW, WGRC-3/S/1 (note 39), para. 3.235.

<sup>74</sup> CWC (note 1), Verification Annex, Part IX, paras 11(b), (c).

<sup>75</sup> See also CWC (note 1), Verification Annex, Part IX, para. 25.



facilities for inspection that—given their chemical and technological characteristics—clearly pose no risk to the object and purpose of the CWC. There are, however, differing views on whether it is desirable to modify (or ‘refine’) the OCPF declaration requirements to focus more on plant sites of higher relevance to the CWC.<sup>76</sup>

In short, the options for enhancing the efficiency of the DOC verification regime incrementally (i.e. by tweaking the current selection methodology) have been all but exhausted. So long as the states parties are not prepared to consider more drastic steps such as those suggested above, the challenges inherent in the current industry verification regime and practice will remain the same (e.g. in terms of focus and efficiency). To provide some degree of confidence in the CWC regime and to maintain its deterrent value, a certain percentage of the sites must be investigated. Thus, chemical industry inspections should be focused on those facilities of most relevance to the convention.

### **The verification capacity of the Technical Secretariat**

The OPCW Technical Secretariat, in its report to the OEWG for the Third Review Conference, identified several important issues related to its capacity to conduct the verification measures foreseen by the CWC.<sup>77</sup> The Review Conference will provide an opportunity to review the situation and provide guidance for future improvements and adaptations. Much of the TS’s work in recent years has focused on gaining efficiency savings through such measures as optimization of verification methods applied at CW destruction facilities, the use of sequential inspections (whereby OPCW inspection teams visit multiple locations in a country or region), the implementation of the VIS and the related Electronic Declaration Tool for National Authorities (EDNA).<sup>78</sup> The TS (supported by interested states parties and the SAB) has also worked on closing various ‘functional gaps’ such as developing protocols for the collection and analysis of biomedical samples and further improving its equipment suite to support the conduct of inspections and related verification measures (e.g. new additions to the OPCW Central Analytical Database, OCAD). The OPCW has also drastically shortened the time required for on-site sample preparation and the time required for approval and acquisition of additional inspection equipment where needed.<sup>79</sup>

As the verification workload continues to shift from verifying the destruction of chemical weapons to ensuring that no new chemical weapons are being produced, several strategic questions should be raised in regard to the future of the CWC verification system: specifically, the capacity of the TS to conduct challenge inspections and chemical industry verification.

<sup>76</sup> E.g. International Council of Chemical Associations, ‘ICCA position paper for the Third Review Conference’, [22 Mar. 2013], <<http://www.icca-chem.org/en/Home/Policy/>>.

<sup>77</sup> OPCW, WGRC-3/S/1 (note 39).

<sup>78</sup> There have been major efforts since the first two review conferences (held in 2003 and 2008, respectively) to expand use of the EDNA system. EDNA has reduced the need for submission of paper declarations, which the TS then had to transform into a digital format for verification and reporting purposes.

<sup>79</sup> OPCW, Scientific Advisory Board, 19th Session, Report, SAB-19/1, 12 Sep. 2012, paras 29–32.



*The Technical Secretariat's capacity to conduct verification activities*

The ability of the TS to conduct challenge inspections and investigations of alleged use has yet to be tested in practice because no party has yet requested such an inspection. While the parties may have different views on whether it would be desirable to use the mechanism for challenge inspection (or for investigations of alleged CW use), the TS cannot afford to lose its ability to implement such special inspections should they be requested. This creates both managerial and technical challenges for the TS, including the following.

1. In the absence of requests for a challenge inspection or investigation of alleged CW use, the only way for the TS to maintain its readiness is by training and practice exercises. Achieving the correct balance between such training and the implementation of routine verification measures is not trivial. The CSP should determine how much time and money the TS should spend on exercises and other forms of training, and how much of its financial and human resources remain available to undertake its routine verification measures. In particular, the parties should assess the extent to which they are willing to devote resources to a mechanism which may never be used. Equally, they should consider whether failure to devote these resources would undermine the capacity of the regime and its deterrent value.

2. These types of inspection also require a different managerial approach: essentially an 'all-TS approach' with the direct involvement of the TS leadership through a mission-support group. They require procedures or protocols that differ significantly from the routine operations of the TS. The TS should assess whether these different procedures and approaches are sufficiently robust and tested in the absence of real challenge inspections. There is a risk that if a real challenge inspection were to be conducted, improvisation could take over to the detriment of an inspection process that must stand up to political and legal scrutiny in the Executive Council.

3. A core group of highly experienced inspectors that have the political, legal and operational experience to lead such sensitive and complex investigative inspections must be maintained. The TS and the parties should examine who can effectively manage (i.e. command and control) large inspection teams, and who possesses the capacity and experience to resolve problems in the field. The application of the 7-year tenure policy has significantly reduced the number of inspectors with a demonstrated track record in the areas of inspection planning and conduct. An ad hoc solution regularly used in routine CW inspections is the use of former OPCW inspectors recruited on a short-term basis as contractors (i.e. Special Service Agreement inspectors). However, this option is not available for challenge inspections. It could be used in investigations of alleged use if these former inspectors were included by the Director-General in the list of 'qualified experts'.<sup>80</sup>

<sup>80</sup> CWC (note 1), Verification Annex, Part XI, paras 7–8.

4. These and related policy and management challenges must be addressed through proper prioritization and through sustained efforts to maintain awareness and expertise within the TS overall, as well as within the OPCW's policy-making organs (especially the Executive Council).

5. Various technical issues also need to be addressed. For example, the investigation of alleged use and challenge inspections requires that the inspection teams be capable of detecting CW agents and other relevant chemicals (such as degradation products, impurities, biomarkers etc.) other than those listed in the CWC schedules. However, the states parties and the Executive Council have been reluctant thus far to allow the inclusion of non-scheduled chemicals in the OPCW's analytical database. In certain scenarios, this can, in effect, blind an inspection team when non-traditional CW threats are involved partly because, according to the managed access provisions that the inspected party may invoke, the team may be required to use specialized software that provides a yes or no answer regarding the presence of a specific chemical.<sup>81</sup>

6. The SAB has also identified a gap in TS capacity relating to forensic analysis.<sup>82</sup> This issue was less relevant when the focus of verification was on state programmes. But in present-day circumstances, tracing toxic agents back to their origin and method of production is increasingly important.<sup>83</sup> Laboratories engaged with CW issues have only just begun addressing this matter in a systematic fashion, and the OPCW could present a platform for international collaboration in the development of new methods and analytical protocols in forensic analysis, similar to what it did in the context of setting up its network of designated laboratories.

7. Challenges also remain with regard to inspection equipment required in special inspections (e.g. communications in the field, portability and ruggedness of inspection equipment). Such issues require further TS attention.

The Third Review Conference will be an opportunity to raise awareness among the parties, as well as the TS, on these issues and to decide how future priorities should be set. Progress in some areas will largely be incremental. But the challenge will be to avoid a situation where a strong mechanism for resolving serious compliance concerns (i.e. investigation of alleged use and challenge inspections) becomes unusable because the technical ability to implement it in practice has degraded to a point where the parties are no longer confident in the results that such an inspection might yield.

<sup>81</sup> For challenge inspection managed access provisions see CWC (note 1), Verification Annex, Part X, paras. 46–52.

<sup>82</sup> The SAB had a temporary working group on sampling and analysis protocols. OPCW, RC-3/DG.1 (note 3), pp. 6, 22, 24.

<sup>83</sup> See e.g. Fraga, C. G. et al., 'Impurity profiling to match a nerve agent to its precursor source for chemical forensics applications', *Analytical Chemistry*, vol. 83, no. 24 (15 Dec. 2011), pp. 9564–72; and Noort, D. et al., 'Chemical profiling of chemical warfare agents for forensic purposes', Paper presented at the 10th International Symposium on Protection against Chemical and Biological Warfare Agents, Stockholm, 8–11 June 2010, <[http://www.cbwsymp.foi.se/Abstracts\\_10/Noort.pdf](http://www.cbwsymp.foi.se/Abstracts_10/Noort.pdf)>.

*Industry verification*

Applying the 7-year tenure policy—which limits most individual’s employment with the OPCW to 7 years—has created a difficult balancing act for the TS. On the one hand, it enables the recruitment of new inspectors who have the most current technical experience regarding new technologies and industrial practices. On the other hand, it effectively reduces the TS staff’s cumulative inspection experience, including in the chemical industry. Knowledge transfer and reliance on rigid protocols is one approach to resolve this tension. However, they cannot replace institutional memory. In situations when the outcome of an inspection depends on the ability of inspectors to resolve unexpected difficulties in the field, the presence of inspectors with adequate verification experience can be critical.

On the technical side, a key issue remains further reducing the time needed to conduct on-site chemical analysis during industry inspections with short inspection periods (for Schedule-3 facilities and OCPFs). Much progress has been made by the TS to shorten the set-up and calibration time in the field and to drastically reduce the time required for sample preparation.<sup>84</sup> Nevertheless, the number of samples that an inspection can analyse on-site during the 24-hour inspection period at such facilities is fairly limited.<sup>85</sup> At large and complex industrial sites in particular, that may limit the dependability of inspections confirming the absence of undeclared CW-related activities.

This leads to the wider issue of what the primary purpose of industry inspections is and whether current inspection conduct achieves it. The TS background paper for the OEWG gives the general impression that the primary focus of inspections is to check that the information declared on a facility is consistent with the situation on the ground. For example, the TS paper states that ‘The relationship between the OPCW and the chemical industry has been evolving over time. The OPCW is not only seen as an auditor and regulator, but also as a potential partner in improving the verification regime to ensure that chemicals are not used for prohibited purposes, as well as contributing to the capacity building of States Parties.’<sup>86</sup> There appears to be less of a focus on the broader questions of whether an inspected facility is capable of engaging in CW-related activities and how confident the inspection team is that the facility would not engage in such activities if it had the technological capability to do so.

Along similar lines, the parties should address the question of whether the particular focus, prescribed by the CWC, on demonstrating the absence of Schedule-1 chemicals is the correct approach in the long run.<sup>87</sup> The convention leaves room for a wider application of inspection aims, under the general requirement to confirm that the activities at a facility are consistent with the

<sup>84</sup> OPCW, RC-3/DG.1 (note 3), para. 93.

<sup>85</sup> Sampling and analysis can, given the will and proper planning, now be achieved in this time frame. The taking of samples would have to be done in the early part of the inspection and an auto-sampler can run overnight. See OPCW, RC-3/DG.1 (note 3), para. 91.

<sup>86</sup> OPCW, WGRC-3/S/1 (note 39), para. 3.490.

<sup>87</sup> CWC (note 1), Verification Annex, Part VII, para. 15(a), Part VIII, para. 17, and Part IX, para. 14.

information provided in declarations. But it is unclear how such a wider verification approach can be implemented, what types of experience, skills and approach it would require of the TS, and whether the policymaking organs and the parties politically support such an approach.

If such an approach is not adopted, there is a risk that over time, as science and technology advance and industry practices evolve, the relevance of chemical industry inspections for contemporary security concerns related to the possible production, stockpiling and use of toxic chemicals for hostile purposes would begin to dwindle. This issue concerns how industry verification relates to the application of the CWC's general purpose criterion—as long as verification focuses primarily on scheduled chemicals, the convention's goal to prevent the misuse of any toxic chemical for warfare purposes is only safeguarded in part. As the distance between the chemistry and technology associated with past CW programmes (as reflected in the CWC's schedules) and contemporary chemical industry practices increases, the question of how to reflect the general purpose criterion in the practice of industry verification will become more and more pressing.

The Third Review Conference is not a likely (or suitable) place to resolve these issues, but it may create an opportunity to raise these concerns and lead into a longer-term conversation among states parties about the desired future of the industry verification regime, and about the technical capabilities and skills that the TS should be developing.

## 4. Preparedness and response

The Chemical Weapons Convention contains provisions that deal with preparedness and response to the use or threat of use of chemical weapons. With regard to preparedness, these provisions include the right of the parties to protect themselves against CW attack and urge international cooperation among the parties in the field of chemical protection.<sup>88</sup> The OPCW may also provide expert advice on enhancing protective capacity. With regard to response, the OPCW has put in place a mechanism for investigation of alleged use and provides measures to deliver and coordinate assistance to the states parties that fall victim to such weapons.<sup>89</sup> These provisions were originally included in the CWC with the use or threat of use of CW in armed conflict in mind. This continues to be an important consideration in certain regional settings where military arsenals with CW still exist (e.g. in non-party states with CW capabilities, such as in the Middle East or on the Korean Peninsula).

Today, preparedness and response are viewed in a wider context that includes (a) chemical, biological, radiological and nuclear (CBRN) weapons, (b) state-based armed conflict and also the use of CBRN materials by non-state actors (e.g. terrorists and criminals), and (c) overlapping preparedness and response mechanisms to both counter deliberate releases of chemicals and deal with natural events or industrial or transport accidents. At the national and, sometimes, regional levels, states are increasingly taking a comprehensive ‘all-risks, all-government’ approach. These solutions also envisage private–public partnerships. An example of this approach is the EU CBRN Action Plan.<sup>90</sup>

### The OPCW’s role

In the first two review conferences, the OPCW already publicly recognized that it has a contribution to make in assisting the parties to strengthen their response capacities (among others with reference to terrorist threats to chemical facilities).<sup>91</sup> The Third Review Conference offers an opportunity to further define this role and to clarify what the OPCW can or should be doing, as well as identify its limits with regard to mandate, expertise, capacity and so on. This should be part of the wider conversation about the OPCW’s possible role at the nexus of chemical safety and security.

The OPCW is not the only international body with a clear mandate regarding response: a range of UN agencies and international and regional organizations

<sup>88</sup> CWC (note 1), Article X.

<sup>89</sup> Hart, J., ‘Political and technical aspects of challenge inspections under the Chemical Weapons Convention’, Paper presented at the EU Seminar on ‘Challenge Inspections’ in the Framework of the CWC, Vienna, 24–25 June 2004, <[http://www.sipri.org/research/disarmament/chembio/PDFs/hart\\_CWC\\_2004](http://www.sipri.org/research/disarmament/chembio/PDFs/hart_CWC_2004)>.

<sup>90</sup> European Commission, ‘An EU CBRN Action Plan’, Communication from the Commission to the European Parliament and the Council on Strengthening Chemical, Biological, Radiological and Nuclear Security in the European Union, COM(2009) 273 final, 24 June 2009.

<sup>91</sup> E.g. OPCW, First CWC Review Conference, Report, RC-1/5, 9 May 2003, para. 7.93.

also have such mandates. In addition, there are a variety of military mechanisms and capacities (which are beyond the scope of this report). In addition to these existing institutional response mechanisms, it may be advisable for the OPCW to develop strategic relations or understandings with various non-governmental organizations that carry out fieldwork (for emergency relief or development) and with the chemical industry. This implies the further development of legal and regulatory frameworks (where needed) and the elaboration of protocols for operational coordination, consultation and training.

In its broader international collaboration in preparedness and response, the OPCW is beginning to move from ad hoc to systematic and sustainable approaches. This can include identifying and maintaining contact with key partners, such as OCHA, UNODA and the World Health Organization (WHO).<sup>92</sup> Administrative and technical mechanisms also need to be in place to allow this contact to function effectively.

The parties themselves need a better understanding of preparedness and response. This need and its benefit to the parties could be contrasted with the consequences of merely continuing as before. Other areas for discussion could include legal and political uncertainties and misunderstandings (e.g. the situation in Syria and the additional chaos and humanitarian tragedy that would result were CW used). Additionally, an understanding ought to be reached by relevant organizations on how to address the actual use of CW and a determination made of what would be needed and available to respond to such a situation. Current efforts by the North Atlantic Treaty Organization (NATO) to maintain and develop CBRN ‘reach back’ capabilities—whereby people in the field are able to access national experts and organizational expertise for advice and other support which, in turn, produces a ‘multiplier effect’—may be relevant in this regard.

Preparedness and response are not merely administrative, legal or government-driven topics; they involve other stakeholders and include building a security culture in the chemical field, including in industry, research and academia. The potential for activity by the OPCW is not merely associated with the application of CWC Article X (on ‘Assistance and protection against chemical weapons’) but also relates to what can be achieved under Article XI (on ‘Economic and technological development’). The types of activity by the OPCW in this field could range from providing a platform for discussion and exchange of experience in order to facilitate cooperation and assistance among states parties to practical work in the field. How much this can achieve will depend on the actual knowledge base, expertise and capacity that the Technical Secretariat will be able to maintain and develop, as well as on the resources and political support that states parties are able to agree on. The Third CWC Review Conference faces strategic choices in terms of considering where and how decisions about policies can be taken, priorities identified and future direction agreed

<sup>92</sup> E.g. in Nov. 2012 the OPCW signed ‘interface procedures’ with OCHA. OPCW, WGRC-3/S/1 (note 39), para. 3.326; and OPCW (note 45).

## The CBRN Centres of Excellence

A new opportunity that the OPCW may exploit after the Review Conference is the establishment of regional CBRN Centres of Excellence (COEs), set up with seed funding from the European Union as part of its Instrument for Stability (IFS).<sup>93</sup> Launched in 2010, COEs are being established in five regional centres: North Africa; the African Atlantic facade; the Middle East; South Eastern Europe, the Southern Caucasus, Moldova and Ukraine; and South East Asia.<sup>94</sup> These centres create a regional and national context to organize and coordinate multiple donors and organizations that provide technical assistance and support in a range of areas relevant to preparedness and response. Their activities start with legislation and include projects and capacity building in such areas as export control of dual-use goods, chemical safety and security, biosafety and bio-security, nuclear and radiological forensics and detection, and border controls.

In previous years, the collaboration between the EU and the OPCW took the form of Council joint actions (now replaced with Council decisions). This form of collaboration reflects the common approach of the EU (i.e. the member states) to promote the activities of international organizations such as the OPCW in well-defined areas. In the case of the OPCW, this has included support for achieving universal CWC membership, national implementation, international cooperation, and certain initiatives in the field of chemical safety and security. These areas are of interest to the EU and complement elements of its Common Foreign and Security Policy (CFSP) in the area of security and non-proliferation of WMD.<sup>95</sup> The EU CBRN COEs, however, are an initiative of the European Commission under the IFS. This activity is being implemented by the EU's Joint Research Centre and UN Interregional Crime and Justice Research Institute (UNICRI). It entails the establishment of national focal points and national teams in the area of CBRN risk mitigation in partner countries outside the EU, and the establishment of regional secretariats that coordinate the work of the COEs and act as clearing houses for the development and execution of projects in the field of CBRN risk mitigation that are funded by the initiative. The COEs also manage the communication and sharing of information between national teams and external actors such as the EU, relevant international organizations and other stakeholders.

The COEs and associated national teams implement a 'coordinated strategy for CBRN risk mitigation'.<sup>96</sup> According to the EU CBRN COE: 'The origin of the risk can be criminal (proliferation, theft, sabotage and illicit trafficking), accidental

<sup>93</sup> On the initiative and its projects see the website of the CBRN Centres of Excellence, <<http://www.cbrn-coe.eu>>.

<sup>94</sup> Three additional regional secretariats—in Central Asia, the Gulf Cooperation Council states, and East and Central Africa—are to be established at a later stage.

<sup>95</sup> Council of the European Union, 'Fight against the proliferation of weapons of mass destruction: EU strategy against proliferation of Weapons of Mass Destruction', 15708/03, 10 Dec. 2003.

<sup>96</sup> Hart, J. and Clevestig, P., 'Reducing security threats from chemical and biological materials', *SIPRI Yearbook 2010: Armaments, Disarmament and International Security* (Oxford University Press: Oxford, 2010), pp. 418–21; and CBRN Centres of Excellence, 'A coordinated strategy for CBRN risk mitigation', <<http://www.cbrn-coe.eu/ReadMore.aspx>>.



(industrial catastrophes, in particular chemical or nuclear, waste treatment and transport) or natural (mainly pandemics).<sup>97</sup> This system is being developed to support systematic needs assessments at the national level, to deliver regional and supra-regional projects that assist to improve the capacity of partner countries, and to ensure programme sustainability and impact.

The COEs, all located outside the EU, create opportunities for the OPCW in several respects. As a partner in the initiative, the OPCW can use the network to channel outreach activities and spread information on CWC issues. The COEs also offer opportunities for the OPCW to join projects and activity that are operationally relevant to CWC implementation objectives, for example on chemical safety and security, national implementing legislation, and training for response operations. Finally, the COEs could provide a platform for inter-agency cooperation, coordination and co-funding for projects related to CBRN risk mitigation that involve a range of stakeholders and organizations.

In addition to enabling collaboration with other actors, which will be essential for the OPCW as it further engages in the activities to enhance the capacity of the states parties in preparedness and response, the COE initiative has other features that make collaboration with these centres attractive. A key feature is the use of systematic needs assessment as the basis for the formulation and adoption of capacity-building programmes and other projects under the auspices of the COEs. The OPCW itself has on several occasions recognized the importance of reliable and accurate needs assessments as the basis for measures it implements under articles X and XI of the CWC.<sup>98</sup> Robust needs assessments are essential to create reliable baselines in order to evaluate the success of capacity-building measures and to demonstrate that technical assistance and collaboration projects have achieved the desired results and have had an impact in the participating countries.

### **The OPCW as a facilitator in chemical safety and security**

It will be important for the OPCW to enhance its collaboration with other international actors and agencies that work in related fields relevant to enhancing the capacity of the states parties in preparedness for and response to incidents involving toxic chemicals.

A part of this engagement relates to the role that the OPCW can play as a facilitator and enabler in the field of chemical safety and security. The CWC creates a mandate for the OPCW and the parties to facilitate the fullest possible exchange in chemicals, equipment, and scientific and technological information related to the development and application of chemistry for peaceful purposes—subject to the CWC's provisions and without prejudice to the principles and applicable rules of international law. This latter condition was already implicitly

<sup>97</sup> CBRN Centres of Excellence (note 93).

<sup>98</sup> For the language agreed by the first 2 CWC review conferences on Article XI see OPCW, RC-1/5 (note 91), paras 7.104–7.109; and OPCW, Second CWC Review Conference, Report, RC-2/4, 18 Apr. 2008, paras 9.110–9.118.



invoked by the OPCW when it established its implementation support programme (in conjunction with other provisions of the convention that mandate the TS to provide technical assistance and advice to the parties).<sup>99</sup> A broader reading of Article XI would allow the OPCW to expand the role that it plays in the wider field of chemical safety and security. Such a broader role would have to build on the TS's existing competencies and capacities as well as the knowledge base available to the TS via its expert networks involving institutions and individuals from the states parties.

On this basis, the OPCW could strengthen its role as facilitator and enabler of collaboration in the field of chemical safety and security, with particular emphasis on areas such as (a) awareness raising on requirements in chemical safety and security (in academia, chemistry education, the chemical industry, and among users of chemical products and technologies); (b) promotion of internal compliance systems in the chemical industry; (c) promotion of national control measures; and (d) exchange of experiences and good practices among practitioners and the states parties' institutions active in the field of chemical safety and security.

<sup>99</sup> On technical advice and technical evaluation see CWC (note 1), Article VIII, para. 38(e). On expert advice and assistance in the implementation of national programmes in the field of protection against toxic chemicals see CWC (note 1), Article X, para. 5.

## 5. Conclusions

The Third Review Conference of the Chemical Weapons Convention comes at a singular point in the evolution of the convention. On the one hand, most observers agree that a transition process is starting that will modify the mandates and rebalance the priorities of the CWC regime as the tasks connected to chemical weapon disarmament shrink. Decisions on the future directions and strategic goals of the OPCW will need to be taken soon. At the same time, it is perhaps premature to expect more than incremental adjustments to the regime's operation.

Conditions in the international security environment, in science and technology, and in the chemical industry differ significantly from those that existed at the time the CWC negotiations were concluded, in 1992. The convention's implementation mechanisms nevertheless continue to function well and there is little (if any) desire among the parties to make dramatic changes to it. Therefore, while the Review Conference may further consider possible decisions on matters of substance, in many areas it will be the decisions on the process to follow the conference that matter most. These include action on those issues that the constituent bodies of the OPCW—the Conference of the States Parties, the Executive Council and the Technical Secretariat—will be tasked to undertake as a priority and how they inform future decision making that the Third Review Conference will not draw attention to or, perhaps, even foresee.

The Third Review Conference will probably not be in a position to change the strategic direction of CWC implementation. In order for this to occur, more conceptual discussions would be needed before states parties can achieve broad consensus on how the regime should proceed. This sort of consultation has largely not occurred due to a more general conservatism, which seeks to avoid unnecessary discord, as well as a general tendency by the parties to limit the cost, scope and level of intrusiveness of the regime to what was sufficient for effective convention implementation in the past. The Third Review Conference could more feasibly (and practically) represent the start of such a strategic conversation. This conference has the potential to open avenues for consultation among the parties on selected topics with external input. Simultaneously, the conference should avoid taking decisions that may preclude adjustments and changes in direction. Such hindering actions (or other unfortunate effects) can be caused by the decision-taking process itself. It can also occur by implication if such decisions adversely affect the capabilities of the TS.

The CWC regime requires continued political and technical support and engagement to ensure its future international security relevance. At a time of asymmetric threats, the greatest security challenges may arise from unlikely sources. The Third Review Conference offers an important opportunity to ensure that the convention remains fully supported in order to achieve all of its core objectives.

## **Options for decisions and activities for the Third CWC Review Conference**

The following suggestions for decisions that the Third Review Conference could take are offered to the parties for their consideration.

### *Decisions on verification*

Verification concepts should be revisited in the light of the inspections carried out, the databases on facilities, and their focus and operation. It would be desirable for the OPCW to further consider these matters.

The Review Conference could initiate an interdisciplinary expert study (involving government experts, industry experts, academics, research scientists, the Scientific Advisory Board and the Technical Secretariat) to prepare analyses and recommendations on (a) options for the possible evolution of the industry verification system (such as adjusting the OCPF regime so that it can deal with new science and technology and industry developments to ensure better focus and to deal with chemical and biological convergence), (b) the ability and capacity of the CWC regime to investigate compliance issues, including those related to non-traditional agents, and (c) attribution issues (e.g. examining where the OPCW lacks experience and technical capacity, and whether the OPCW can serve as a platform for international collaboration to develop such a capability).

The Review Conference could consider the following two questions: How can or should the use of industrial chemicals by a non-state actor in a conflict situation be handled in the CWC context? Should the Executive Council review its handling of all compliance-related matters since the CWC's entry into force with a view to compiling a list of good practices and lessons learned?

### *Decisions on national implementation*

The focus on full and effective national implementation continues. However, this process is incomplete and insufficiently developed. While considerable progress has been made in designating or establishing national authorities, more needs to be done to fully empower all of them to play their role in the implementation process, and significant legislative and regulatory gaps remain as well as weaknesses in convention enforcement at the national level. Thus, a new phase of implementation of Article VII (on 'National implementation') is about to occur. The relevant actors have been identified by the TS and a network in effect now exists that should be more fully utilized.

The Review Conference could encourage the parties to (a) complete their legislative work to create the necessary domestic legal, regulatory and administrative framework to ensure full CWC implementation, (b) institute domestic mechanisms that will enable them to adapt existing regulations and administrative measures to changing requirements emanating from developments in science, technology and industry, (c) undertake efforts to share experience concerning the involvement of stakeholders to ensure CWC compliance (including internal compliance mechanisms in industry, professional codes of conduct, oversight mechanisms in research and development, outreach, awareness raising,

and education), (d) take part in exchanges and discussion among the parties to identify and propagate good practices in CWC implementation, and (e) encourage the TS to continue to work with the parties to provide legislative and practical implementation assistance to the parties that require this, as well as to render support to the remaining states not party to the convention—if and when they prepare for CWC accession.

*Decisions on science and technology monitoring*

The Review Conference could encourage the TS—in collaboration with the SAB and external actors, such as international science unions and associations—to strengthen its science and technology monitoring functions to include regular short- and longer-term science and technology evaluation exercises as well as responding to requests for related advice on issues emanating from CWC implementation,

The Review Conference could enhance working relations with the BTWC community by, for example, organizing and participating in joint expert meetings in order to further clarify the implications of biological and chemical convergence for the two treaty regimes.

The Review Conference could further institutionalize the working relationship between the IUPAC and the SAB.

*Decisions on articles X and XI*

The Review Conference could initiate a systematic review of relevant domestic, regional and international CBRN ‘reach back’ capability to national and organizational experts.

The Review Conference could review lessons learned from the current BTWC Implementation Support Unit database project to compile offers and requests for assistance.

The Review Conference could develop further operational links with other international agencies having relevant mandates in the field of preparedness and response (including investigation of alleged CW use), including with the EU CBRN COEs and similar initiatives.

The Review Conference could consider how the OPCW could function as an enabler of cooperation and exchanges between states parties as regards chemical safety and security.

*Relations between the OPCW and the chemical industry*

The Review Conference could consider measures that could be taken to further institutionalize the working relationship between the chemical industry and the OPCW.

The Review Conference could consider when (and to what extent or whether at all) declaration and verification of OCPFs should include facilities that use non-traditional technologies for chemical manufacturing (e.g. farming using transgenic animals or plants, followed by extraction, chemical modification and purification). It could also consider whether certain fermentation facilities that

use cell cultures for chemical manufacturing should be covered by the routine declaration and verification system, and what parts of the food industry should be covered, if any.

As the convergence between biological and chemical industries deepens, the Review Conference could consider how confidentiality perceptions will change within those industries that are subject to verification under the CWC (e.g. in view of high, up-front investments with no immediate returns, for companies based on single patents, or industrial secrets), and the consequences of such changes in terms of CWC industry verification.

Traditional CW production facilities tended to be small compared to many civilian chemical industry facilities. The Review Conference could consider whether large-scale production facilities are susceptible to effective CWC verification. If they are not, then the Review Conference could assess the implications for such verification parameters as inspection frequency and duration, how large and complex industrial sites can be inspected within short time frames, and how meaningful sampling and analysis will be at such sites. For large, stand-alone plants that are typically continuously operating single-product facilities, the Review Conference could consider whether they are relevant for CWC verification purposes (e.g. should they be favoured by verification in view of the product's toxicity, or the importance of secrecy for protecting the business model).

If severe limits are placed on what verification can actually deliver (or how it is being performed) in future, the Review Conference could consider the alternatives, and what can be done to create a broader 'web' of deterrence and compliance.



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Chemical weapon disarmament remains central to the implementation of the 1993 Chemical Weapons Convention (CWC). But full and effective implementation also entails a wide variety of other activities. To achieve all these goals, in the coming months and years the states parties to the CWC will determine how the regime will adapt to the changing international security environment and to developments in science and technology.

This report presents proposals for strategic approaches and directions for the parties to consider in their assessment of the CWC's operation. By placing the convention in a broader security and technological context, it examines operational and policy issues, with a view to informing the future activities of the Organisation for the Prohibition of Chemical Weapons (OPCW). The report will be of lasting interest and relevance to those interested in functional aspects of implementing the CWC regime and maintaining its future relevance.

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